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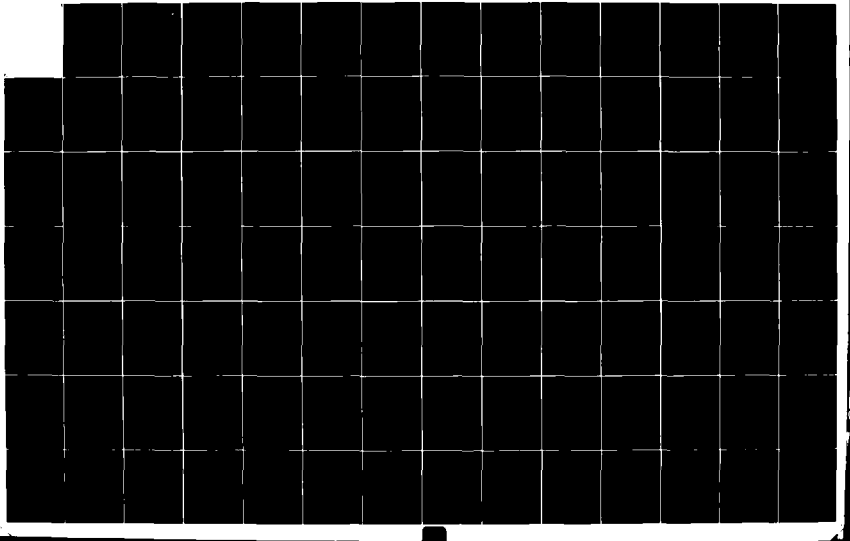

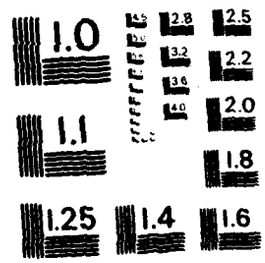

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20 ABSTRACT (Continue on reverse side if necessary and identify by block number)

The Department of Defense relies on commercial airlines to provide approximately fifty percent of the United States' strategic airlift during a national emergency by mobilizing the Civil Reserve Air Fleet (CRAF). This study investigates the effect of a major civil airline bankruptcy on CRAF. This research also examined the adequacy of plans to deal with CRAF carrier corporate failures and found that while the loss of a major carrier would adversely affect strategic airlift capability, no plans exist to cope with the eventuality. Investigative conclusions are analyzed and feasible recommendations (Abstract continued on rear)

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ABSTRACT CONTINUED

ARE SUGGESTED TO OVERCOME THE LACK OF PLANS TO DEAL WITH A MAJOR AIR CARRIER FAILURE.

ADDITIONAL AUTHORS

John D. Phillips
Colonel, US Air Force

Richard K. Vogel
Lieutenant Colonel, US Air Force Reserve

THE NATIONAL WAR COLLEGE
INDUSTRIAL COLLEGE OF THE ARMED FORCES
NATIONAL DEFENSE UNIVERSITY

STRATEGIC STUDY

THE EFFECT OF A MAJOR AIR CARRIER'S FAILURE ON THE CIVIL RESERVE AIR FLEET

By

Wayne DeLawter
Colonel, USAFR
John F. Phillips
Colonel, USAF
Richard Vogel
Lieutenant Colonel, USAFR

A RESEARCH REPORT SUBMITTED TO THE FACULTY

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STRATEGIC STUDIES REPORT ABSTRACT

TITLE: The Effect of a Major Air Carrier's Failure on the Civil Reserve Air Fleet

AUTHORS: Wayne E. DeLawter, Colonel, USAFR
John D. Phillips, Colonel, USAF
Richard K. Vogel, Lieutenant Colonel, USAFR

DATE: April 1983

The Department of Defense relies on commercial airlines to provide approximately fifty percent of the United States strategic airlift during a national emergency by mobilizing the Civil Reserve Air Fleet (CRAF). This study investigates the effect of a major civil airline bankruptcy on CRAF. This research also examined the adequacy of plans to deal with CRAF carrier corporate failures and found that while the loss of a major carrier would adversely affect strategic airlift capability, no plans exist to cope with the eventuality. Investigative conclusions are analyzed and feasible recommendations are suggested to overcome the lack of plans to deal with a major air carrier failure.

BIOGRAPHICAL SKETCHES

Colonel Wayne E. DeLawter, USAFR, (B.S., Purdue University), has 18 years of operational experience in strategic and tactical airlift. He served five years on active duty, flying a combat tour in Vietnam and in the Military Airlift Command (MAC) as an aircraft commander and flight examiner in the C-7A and C-141A/B, respectively. In 1969, he joined Trans World Airlines and flew as a line crewmember, then later as an FAA designee check airman in a management position. Since 1969, Colonel DeLawter actively participated in the C-141 Reserve Associate Program as a Squadron Training Officer, Standardization Officer, Chief Pilot, and Operations Officer. He holds a USAF Command Pilot rating and logged more than 7,500 flying hours in most theaters of operation, to include 205 combat missions in Vietnam. In commercial aviation, he holds several FAA ratings to include Airline Transport Pilot. With Trans World Airlines, he has flown over 4,000 flying hours on both domestic and international routes. Colonel DeLawter is a graduate of the Industrial College of the Armed Forces, (non-resident), and is a graduate of the Industrial College of the Armed Forces, Class of 1983.

Colonel John F. Phillips, USAF, (Pre-Med degree, Jarvis College, Texas; M.S., in Aeronautical Engineering, University of Southern California; M.S., in Logistics, Air Force Institute of Technology) is a PhD candidate in International Relations at Texas A&M University. Colonel Phillips is a rated pilot and navigator with over 3,000 flying hours. His assignments include: Instructor navigator in KC-135s; Instructor pilot in T-37 and T-38 aircraft; Propulsion engineer; logistics analyst; Director of Logistics for Airlift and Trainer Systems; and System Program Director for Tactical Reconnaissance Aircraft. Colonel Phillips is a graduate of Air Command and Staff College (non-resident), Industrial College of the Armed Forces (non-resident), and The National War College, Class of 1983.

Lieutenant Colonel Richard K. Vogel, USAFR, (B.S., Engineering Technology, Kent State University, Ohio) has more than 15 years of operational experience in strategic airlift in both military and civilian sectors. He has served in the Military Airlift Command (MAC) as an aircraft commander, flight instructor and flight examiner in the C-141A/B aircraft. In 1966, he joined a major international airline as a line crewmember and has extensive experience in civil international airline operations in Boeing 707 and Boeing 747 aircraft. Since 1969, he has actively participated in the C-141 Associate Reserve Program while serving as a Squadron Standardization

Officer, Squadron Flying Safety Officer, Air Operations Officer, Chief of Wing Flying Safety, and Squadron Commander. He holds the USAF aeronautical rating of Command Pilot, FAA ratings of Airline Transport Pilot and Turboject Engineer, and has logged in excess of 15,000 flying hours in most areas of the world. He was active in both civil and military airlift operations in Southeast Asia with more than 100 missions into South Vietnam. Lieutenant Colonel Vogel is a graduate of Air Command and Staff College (non-resident), Industrial College of the Armed Forces (non-resident), and is a graduate of The National War College, Class of 1983.

EXECUTIVE SUMMARY

This study investigates the adequacy of existing plans to assure continued airlift support to the United States in the event of bankruptcy of a major U.S. airline. During a national emergency, approximately ninety percent of U.S. passenger airlift and thirty-eight percent of U.S. cargo airlift will be provided by the civil sector through the Civil Reserve Air Fleet (CRAF). More specifically, the DOD has tasked the civil aviation sector for nearly ninety percent of its inter-theater passenger capacity and one hundred percent of its cargo capability. Because these civilian contributions are essential to the successful execution of U.S. mobility plans, and several major carriers are dangerously close to insolvency, contingency plans are required to deal with a major air carrier failure, but none exist.

Cargo airlift, especially for outsize equipment such as self-propelled howitzers, fighting vehicles, attack helicopters and support vehicles, is less than adequate to meet early deployment and sustainability requirements. As documented in the Congressionally Mandated Mobility Study, even with CRAF fully generated, inter-theater airlift capability needs to be increased by twenty million ton-miles per day to provide an adequate capability for force projection. Because there are no plans to retain the assets of a failed airline in the CRAF, a bankruptcy would seriously compound the lift shortfall.

During 1982, the airline industry lost in excess of one billion dollars, furloughed more than twenty-two thousand

employees, and, more significantly, experienced the failure of Braniff Airways, a contributor to the CRAF. Several major CRAF contributors, furthermore, are currently in serious economic difficulty. Salient findings of the study are:

1. There are no contingency plans to ensure continued civil airlift support in the event of bankruptcy of a major U.S. airline.

2. Responsibility for emergency airlift is fragmented among several federal agencies, diluting the overall effectiveness of airlift management.

3. Analysis shows that Pan American World Airways, Flying Tigers Line and World Airways are experiencing financial problems. Pan Am is the largest single passenger carrier in CRAF and Flying Tigers the largest cargo carrier, while World also contributes signficiantly to the freighter fleet. Failure of any would represent a significant loss to CRAF.

4. Factors leading to airline bankruptcies are generic to the industry and can, over time, affect other major U.S. airlines.

5. Aircraft of bankrupt airlines may not be available to the Department of Defense until resolution of financial arrangements with lending institutions, both foreign and domestic, have been made.

6. Aircraft placed in dry storage by financial receivers require a minimum of two weeks to become operationally ready,

and other aircraft may demand much more. The requirements for the CRAF are aircraft availability in forty-eight hours. Aircraft sold by receivers to foreign carriers and to salvage are, obviously, totally lost to the CRAF.

7. Commercial pilots of bankrupt airlines will become noncurrent and not legal for flight operations after ninety days of flight inactivity.

8. The foreign infrastructure consisting of ground handling equipment, maintenance and terminal facilities and personnel will be lost.

9. There are one hundred forty-two U.S. wide-bodied aircraft unassigned to the CRAF. However, these aircraft are limited to domestic flight operations because of inadequate extended overwater navigation and communications equipment.

The Congress and the DOD need to assess the contribution the civil air carriers make to the U.S. Defense effort, and assume the responsibility of maintaining this vital resource with subsidy if necessary, to maintain essential inter-theater airlift. In conclusion, the loss of a major air carrier vis-a-vis a Chrysler or a Lockheed should be compared relative to its impact on U.S. defense posture. Can we afford the loss and at what cost?

CHAPTER I

INTRODUCTION

The CRAF accounts for nearly half of the strategic aircraft and crews available to this country for use in a national emergency. The role of CRAF is to augment the military airlift force in an emergency. Today, with all CRAF carriers flying and the Military Airlift Command (MAC) fully generated, there is an intertheater airlift capability shortfall of approximately thirty-three million ton miles per day. (See Appendix F) Tomorrow, that shortfall could be worse because civil flag air carrier operations are declining and carriers are selling many of their wide-body aircraft. The B-747 can carry approximately either 100 tons of cargo or 400 troops; DC-10, 55 tons or 250 to 270 troops; L-1011, 250 to 270 troops.[1] Loss of such systems could critically jeopardize our capability to rapidly move men and material to points of conflict.

Historically, CRAF has played an essential role in military planning. The partnership began with U.S. involvement in World War II. Commercial airlines, under contract with the Air Transport Command and the Naval Air Training Service, flew more than 1.4 million hours, resulting in more than four billion passenger miles and one billion cargo ton miles for the military to overseas locations.

U.S. airlines also helped make the Berlin Airlift a

success. They flew more than six hundred transatlantic flights in support of the airlift between June 1948 and May 1949.

During the Korean War, U.S. airlines augmented military air transport by carrying sixty-seven percent of the passengers, thirty-six percent of the military freight and seventy percent of the mail.

During the Vietnam conflict, U.S. airlines played an even larger role in augmenting military airlift. When this conflict was expanding in 1965 and 1966, U.S. airlines were transporting an estimated eighty-eight percent of the military passengers into the theater. Commercial carriers airlifted more than 2,500 passengers and 180 tons of cargo daily into Vietnam during these years.

Today, CRAF will provide approximately ninety percent of U.S. passenger airlift and thirty-eight percent of U.S. cargo airlift in an emergency using airline air terminal infrastructure for enroute support. The Joint CHiefs of Staff asserts that CRAF contribution is essential to the successful execution of U.S. operation plans. They believe that the health of the transportation industry, especially those which provide intertheater mobility assets, must be maintained.[2]

We ask the following question: if it is necessary to assure access to CRAF assets, what plans exist to assure continued airlift support in the event of airline insolvency? We find the question germane because there is convincing

evidence that several major U.S. airlines are on the brink of bankruptcy.

The Transportation Research Board has predicted fewer but financially stronger airlines for the 1980's.[3] There is no assurance, however, that newly formed or expanding airlines will replace those that might be lost from the CRAF. Because of the state of the U.S. and international economies, airline bankruptcies can be realistically expected, and the affect on CRAF is apparent. Therefore, valid plans should exist to assure airlift capability is not further diminished by the failure of a key CRAF participant.

DISCLAIMER-ABSTAINER

This research report represents the views of the authors and does not necessarily reflect the official opinion of The National War College, the Industrial College of the Armed Forces, the National Defense University, or the Department of Defense.

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CHAPTER II

STUDY OBJECTIVE

The bankruptcy of one major and several small U.S. air carriers in 1982, coupled with major air carrier financial difficulties, properly causes apprehension among military leaders concerned with strategic airlift. Since the CRAF is committed to carry nearly all of the military personnel and about five percent of the cargo in an emergency, the loss of a major air carrier supporting the CRAF would adversely affect U.S. flexible response capability.

The impact on the CRAF of a failed carrier depends upon the contribution the company makes to the program through its aircraft and supporting infrastructure. For example, World Airways and Pan American World Airways contribute together thirty percent of the passenger and twelve percent of the cargo capacity to CRAF, while Flying Tigers alone provides more than thirty percent of the total cargo capability, and all are vulnerable to financial failure. The failure of any one would cause a disastrous effect upon strategic airlift capability.

The objective of this study is to examine the adequacy of military plans to deal with CRAF carrier corporate failures, and to demonstrate, through regression analysis, that some main CRAF contributors are vulnerable. Additionally, we examined the Braniff Airways insolvency. By using that company as a model, we made assumptions concerning the disposition of equipment from companies which may not survive.

CHAPTER III

CRAF CONTRIBUTION TO STRATEGIC AIRLIFT

The primary function of CRAF is to augment military airlift during a national emergency. While CRAF is divided into four segments (long-range international, short-range international, domestic, and Alaskan), the long-range segment is of prime importance. This portion would be most affected by a failure of a major international air carrier because of the loss of strategically critical airlift capacity. The long-range international segment provides support for MAC's world-wide mission requirements. Aircraft allocated to this segment are capable of extended overwater operations with a productive payload. Desired range is 3,500 nautical miles; however, cargo aircraft with 2300 NM capability are acceptable in the long-range fleet.

The composition of the CRAF fleet is shown in Appendix B. The 330 long-range international, 16 short-range international, 11 Alaskan, and 30 domestic CRAF aircraft comprise the force which is depended upon to provide airlift in a national emergency.

CRAF Operational Procedures

The current operational plans governing the CRAF are organized for coordination of commercial air carrier augmentation of military airlift; yet CRAF management is disturbingly

fractionated. In addition to the air carriers, the following government and military agencies are affected by CRAF planning: Department of Defense (DOD), Military Airlift Command (MAC), Department of Transportation (DOT), Federal Aviation Administration (FAA), Civil Aeronautics Board (CAB), and Federal Emergency Management Agency (FEMA).

MAC is the operational manager of the CRAF program. MAC and CRAF carriers meet annually to negotiate the terms of the MAC Annual Airlift Services COntract and the CRAF Call Contract. Throughout the year MAC coordinates with the various agents of CRAF carriers to ensure proper operation. If the CRAF is actuated in times of heightened military tensions, the MAC Crisis Action Team (CAT) will provide mission control.

DOD determines the number and types of civil air carrier aircraft needed in the CRAF program to meet the most demanding emergencies. DOD advises DOT of this requirement in terms of ton miles and passenger miles. DOD also advises DOT of the intention to activate any stage of the CRAF.

DOT establishes air transportation priorities and allocates civil air carrier aircraft to the CRAF program. Also, DOT notifies DOD whether the CRAF incremental stage will have a significant affect on the civil air carriers capability to provide essential airline service.

Because of the need to be slective in employing civil airlift, CRAF is activated in three stages, Stage I,

activated by CINCMAC, requires that long-range airlift aircraft be furnished to DOD to support expanded peacetime military airlift requirements. Stage I, designed to minimally disrupt civil commercial services, is expected to be available within twenty-four hours.

Stage II is activated by the Secretary of Defense to provide additional civil airlift augmentation during an emergency that does not require national mobilization. This stage provides a significant increase in augmentation without resorting to full mobilization or the declaration of a national emergency. This airlift capability is also to be available within twenty-four hours.

Under Stage III, airlift resources are activated by an order from the Secretary of Defense, but only after the President or the Congress has declared a national emergency. This airlift is to be available within forty-eight hours.

FAA is authorized to grant waiver and exemptions as emergency conditions warrant. Chapter 10 of MAC Regulation 55-8, lists blanket waivers and exemptions for use only upon Stage III activation. These waivers and exemptions are necessary when carriers operate off their certified routes.

Headquarters MAC initiates aircraft requests after examining the requirements and the aircraft suitability to the mission. This request is submitted to HQ, USAF for approval. The request is then forwarded to the Office of Emergency Transportation (OET) within DOT, for final allocation.

Allocation arbitration is reviewed and resolved by FEMA when other agencies of government (Department of State, Energy, etc.) also require aircraft which have strategic airlift capability.

When CRAF activation is necessary, HQ MAC will advise the CRAF carriers, DOT/OET, CAB, FEMA and the FAA. During CRAF activation, MAC maintains mission control and the carrier retains operational control using its own resources of personnel and equipment to ensure the mission is completed as directed.

Air carrier membership in CRAF is voluntary with pre-arranged commitment of airframes for each stage of activation. As a CRAF member, each carrier commits aircraft, personnel and infrastructure for use in a national defense emergency; in peacetime these air carriers are eligible for MAC airlift service contracts for military cargo or passenger revenue as an incentive for participation. This contract operation benefits both the government and the carrier. It has always been found more cost effective to satisfy some of MAC's oversize/bulk requirements and most of the passenger airlift by using CRAF aircraft rather than owning and operating a larger force of organic aircraft. The carriers, in turn, derive revenue from the contract business because they have committed corporate resources to support CRAF during emergency conditions.

Manpower, aircraft maintenance, and logistic support is the responsibility of the operating carrier. Civilian enroute airfields will be used whenever possible to reduce military base saturation.

The senior lodger is a designated air carrier that is committed to support CRAF aircraft and crews transiting a specific airdrome after CRAF activation. The overseas senior lodger stations and assigned senior lodger carriers are:

Atlantic Area

Amsterdam/Schiphol	- Pan Am	London/Gatwick	- Pan Am
Ankara/Esenboga	- Pan Am	London/Heathrow	- TWA
Athens Intl	- TWA	Madrid/Barajas	- TWA
Barcelona Intl	- TWA	Paris/DeGaulle	- TWA
Brussels Natl	- Pan Am	Prestwick	- Pan Am
Cairo Intl	- TWA	Rome/Fiumicino	- TWA
Copenhagen/Kastrup	- Northwest	Santa Maria	- Pan Am
Frankfurt Main Intl	- Pan Am	Shannon	- Pan Am
Keflavik/Meeks	- Pan Am		
Lisbon/Portela	- TWA		

Pacific Area

Anchorage Intl	- Northwest
Bangkok	- Pan Am
Cold Bay	- Flying Tiger
Guam/Agana	- Pan Am
Honolulu	- United
Manila	- Northwest
Naha	- Northwest
Seol/Kimpo	- Northwest
Tokyo Intl	- Northwest
Wake Island	- Pan Am

CONUS senior lodger stations and carriers are:

Baltimore-Washington Intl	- Eastern
Bangor Intl	- Pan Am
Boston/Logan	- TWA
Miami Intl	- Pan Am
New York/Kennedy	- Pan Am
O'Hara Intl	- United
Wash DC/Dulles	- TWA
Los Angeles Intl	- United

Oakland Intl	- World
San Francisco Intl	- United
Seattle/Tacome	- Northwest

Northwest, Pan American, and Trans World must upon request, in addition to providing aircrews, aircraft, and senior lodger personnel, also provide communications supervisor personnel. Each of these carriers may also be asked to provide a supervisor to HQ MAC at Scott AFB and/or to the alternate command post (MACALT) at McGuire AFB.

History of Airline Problems and Characteristics

Many problems common to most U.S. air carriers threaten profits. The following characteristics have conditioned the development of the U.S. airline industry and will be later amplified: (1) it is a service industry; (2) until recent deregulation, it was closely regulated by the government; (3) it is highly competitive; (4) its demand is seasonal; (5) it has grown rapidly; (6) it is sensitive to fluctuations in the economy; (7) it is an industry with very high costs; (8) it is capital intensive and has high technological turnover; (9) it has a low rate of return on capital investment.

1. The airlines have only service to market. While the U.S. airlines carried more than 5.6 billion tons of air cargo in 1981, the industry's predominant product is the passenger who yields twice the revenue per ton mile of cargo.[1]

Scheduled airlines furthermore on a given day may have its seats ten percent or ninety percent full, but whatever the case, the unused seats cannot be saved or inventoried fo

sale at a later date.

2. Government regulation had a profound effect on the airlines. Although the airline industry grew rapidly under government regulation since the end of World War II, the airlines were not as profitable as corporations in the unregulated sector of the economy. Low rates of profitability came in spite of the CAB's attention to the financial health of the industry.[2]

The CAB was established in 1938 to regulate the control of entry, routes, and fares of the interstate air carriers. It determined what areas would be served, what cities in the areas would be provided air service, what minimum service must be maintained, and what prices may be charged for any passenger, air freight, express, or mail service. The regulation of these aspects, however, proved to be unwieldy for the CAB. Certain issues critical to the industry's health were commonly deliberated for several months, with one case lasting five years and four months. During times of sustained inflation, these delays adversely affected the airlines.[3]

By the early 1970's, stringent government controls had reached the point that the airlines managerial freedom had been severely eroded. Also, consumer groups believed that the inefficiency caused by over regulation resulted in higher fares. Therefore, spurred by politicly active and powerful consumerists, the Ford administration proposed the

deregulation of what had by then become the country's most regulated industry.[4] The airline deregulation concept gained popular political support during the Carter administration. With the passage of the Deregulation Act in October 1978, this highly regulated industry began to transition toward total deregulation by 1983.[5] Deregulation brought about increased competition which has reduced profits.

3. The U.S. airline industry is highly competitive. In the late 1930's and 1940's more than ninety-five percent of a trunk airlines total route system was free of other air competition, while today some ninety percent has from two to nine carriers in direct competition.[6]

Recent deregulation gave impetus to the creation of low cost new airlines. These newly formed airlines, operating with much lower nonunion costs, have reduced the profit margins of the old, established, unionized trunk carriers.

When the approach to domestic regulation reversed, our international aviation policymakers were likewise affected by this domestic deregulation philosophy. The U.S. espoused a goal of pure competition for its flag carriers, as well as for all foreign air carriers operating into the United States. If all international competitors operated by the same rules, open competition would be desirable. Each nation, however, controls its national carrier with pre-conceived national interests, operating under different rules, different interpretations of bilateral agreements,

different forms of financial support, and different policy objectives.[7]

Most foreign carriers are state owned and controlled. In addition to providing air transportation, they may be mandated by the state to earn specific amounts of convertible currency, maintain a level of employment in excess of real needs, support a domestic aircraft-manufacturing industry or a certain foreign aircraft industry for political or economic reasons, or operate commercially unsound routes consistent with a particular foreign policy. Protectionist, noncompetitive policies may also be adopted by authoritarian states as one means of enforcing restrictions on citizen travel. Many small or underdeveloped countries employ protectionist procedures to create a market unattainable by conventional nonpressure commercial practices.[8]

Many foreign competitors employ discriminatory and unfair practices that put U.S. international carriers at a disadvantage. Some control their internal traffic through control of travel agents, freight forwarders, and local reservations systems, they also control the flow of national-originating traffic to international services. Many foreign transatlantic carriers deny reservations on domestic connecting flights unless the transatlantic portion is booked on the national carrier.[9]

The validity of the U.S. government's pro-competitive international aviation policy must be questioned in light of

the disappointing financial results realized by U.S. flag airlines in recent years. In addition to losses, the decline in the North Atlantic market share of the United States carriers that has occurred since 1977 is further evidence that more competition in international aviation markets is undesirable.[10]

4. Demand for air passage varies during the day, the week, and the year. Therefore, airlines have peak periods of travel and slack ones. To illustrate, Trans World Airlines at the Washington National air terminal experiences three major flight pushes--times when a large number of flights depart a station in a short period of time--two occurring in the morning and one in the afternoon. The periods in-between are very slack and very costly for the airline.[11]

The same situation occurs seasonally. For example, the peak traffic period for TWA's domestic east-west traffic has always been in the summer; conversely, the peak for Eastern Air Lines' north-south traffic has always been in the winter. This undesirable single-direction situation that was fostered in the part by the CAB has begun to change. The airlines, under deregulation, are now free to develop routes in any direction to alleviate the seasonal problem.

5. Almost uncontrolled growth in the airline industry has been a problem. In 1938, when the CAB was established, there were 36,259 miles of domestic routes. By the late

1970's, that mileage number had grown to more than 570,000.[12]

While the CAB increased the air routes by an average of three percent a year from 1938 to 1969, the overly optimistic air traffic forecasts of the mid-1960's, spurred by new technology aircraft, led the CAB to increase the 1969 route miles by 181 percent.[13] This phenomenal expansion of competition in 1969 unfortunately conincided with an economic recession which sharply cut airline traffic growth and led to costly overexpansion.

Another significant development which recently affected the expansion of the airlines was deregulation. While it provided for freedom to expand and allowed entry of new airlines, it also proved to be a dominant factor in the demise of Braniff and several smaller carriers.

6. Air carriers are extremely sensitive to fluctuations in the economy. The depressing effect of recessions on passenger demand for air transportation is apparent from chart one.[14] The international and domestic service by the major carriers declined by five percent in 1980 and six percent in 1981 compared to their respective previous year.[15] This followed four years of growth.

The reduction in the total passenger traffic is reflected by the financial statistics. While the airline industry revenues in 1981 reached an all-time high of 36 billion dollars, the operating losses were $421 million. The

previous record loss was $220 million in 1980.[16]

7. The airline industry is plagued by high costs. Most airline operating costs remain about the same whether the airplane is empty or full. Air crew members pay and maintenance costs are the same regardless of the plane's load factor. Depreciation and interest charges, furthermore, do not vary with the number of passengers on board.

Labor costs in the airline industry are higher than in most other industries. It is, however, a high skill industry where higher wages are expected. Recently, though, the labor costs as a percentage of the total operating expenses have dropped markedly. In 1976, the labor costs accounted for about fifty percent of the total operating expenses--by 1982 these costs dropped to below thirty-five percent.[17]

The most significant cost for the airlines (after labor) is fuel. The airlines spent more than ten billion dollars for fuel in 1981, compared with $1.3 billion in 1973. The average cost per gallon of jet fuel in the mid-1960's was 11.7 cents; domestic fuel today costs $.95 per gallon, and international or foreign fuel costs $1.07 per gallon.[18] Fuel accounts for about thirty percent of the total operating costs.

Another increasing cost area is the price of capital. Because of inadequate earnings over the years, the airlines

have been forced to borrow large amounts. This has resulted in a reversal of debt/equity ratio. In the mid-1950's the average scheduled carrier had a sixty percent equity/forty percent debt ratio; today the average equity has dropped to approximately forty percent, while the debt has risen to sixty percent.[19]

8. Air carriers suffer a very high technological turnover. In the past fifty years, technological advances have forced airlines to undertake a re-equipment cycle every eight years on the average. Besides calling for huge capital spending, these cycles require heavy expenses for hiring and training personnel and in plant facilities to accommodate the new aircraft. In general, it takes two to three years before an airline can fully realize the cost benefits of this equipment changeover.[20]

For the past two decades, the airlines have led other U.S. industries, including utilities, manufacturing, and communications in the rate of increase in capital spending.[21]

Eighty percent of an airline's capital investment is in aircraft. Each new generation of replacement aircraft costs six to seven times more per aircraft than its predecessor. For example, first generation jet transports, the DC-8 and B-707, originally cost about $6.7 million each; their replacement aircraft, the B-757 and B-767 originally cost approximately $39.6 and $48.9 million each respectively--a factor of nearly seven times more.[22]

To make future technological advances, the airlines need huge sums of capital. An ATA study of capital requirements estimates that for the ten-year period, 1980-1989, the airlines will need $60 billion additional new capital to meet new equipment requirements.

9. Air carriers are plagued by a low rate of return on capital investment. In 1961, the CAB determined that 10.5 percent would be a fair and reasonable annual rate of return on investment. The "fair" annual return on investment was set by the CAB at 10.5 percent from 1961 to 1971 and twelve percent thereafter. From 1961 to 1971 the domestic trunk carriers earned the 10.5 percent only once.[23] Since 1971 the industry has exceeded the twelve percent operating profit criteria only once, that was in 1978 with $1.4 billion earnings. At the other end of the spectrum, the most recent years, 1980 and 1981, represent the low years with record operating losses of $222 million and $421 million for 1980 and 1981, respectively.[24] Even with fuel price relief, the 1982 loss is estimated to be over $600 million.

The airline industry's record of financial performance is far below the performance of other industries. Profits comparisons of airline, railroad, and the U.S. manufacturing industry since the mid-1960s demonstrate the financial difficulty confronting the airlines. While the railroads have been recognized as being under financial stress, on an annual basis since 1968, the railroads have attained a higher

return on sales than the airlines, except for the relatively good years of 1976, 1977, and 1978.[33]

Economic Analysis of Selected Air Carriers

Five commercial carriers, Pan American, World, Continental, United, and Flying Tigers, were selected for detailed analysis because of their significant contribution to CRAF or possession of wide bodied aircraft which could be used during a national emergency.

The model used to analyze individual airlines was a variation of the model used in this study to analyze the aggregate financial performance of U.S. carriers (Reference Appendix J). We assumed the four key variables identified as affecting the financial performance of the U.S. airline industry in the aggregate would also affect individual airlines. The four variables used were: GNP, fuel cost, revenue passengers, and freight ton miles. The four variables were regressed against the profit margin of each company for the period from 1972 to 1981. All input data are included in Table 1.

From the historical data in Table 1, a prediction model was developed, and sensitivity analysis were performed to predict future airline performance given certain trends in GNP, fuel cost, revenue passengers, and freight ton miles. Data were analyzed at the ninety-five percent confidence level. For a detailed analysis of findings, refer to Appendix J.

INDIVIDUAL CARRIER MODEL

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
PAN AM *	10.3%	9.3	1.9	6.4	7.6	13.0	14.6	10.2	3.6	3.6E
CONTINENTAL*	8.1	8.5	8.0	3.4	8.9	10.8	13.6	11.6	7.6	.5
WORLD **	1.0	1.3	2.2	2.6	2.8	3.0	1.7	1.2	.7	.1
UNITED *	14.6	17.5	16.4	8.8	9.0	9.7	15.8	3.2	6.4	4.6
FLYING TIGERS*	42.5	43.6	33.8	33.6	31.7	31.8	34.2	26.2	19.6	19.1

* operating margin **asset-equity ratio

(Source - Standard and Poors, October 8, 1982)

INDEPENDENT VARIABLES

GNP	1171	1307	1413	1529	1702	1900	2128	2414	2626	2826E
FUEL COST	20	20	20	25	30	32	37	39	75	90
REVENUE PAX (000)	191349	202208	207458	205062	228318	240326	274719	31636	296903	285720
FREIGHT TX (000)	4217452	4736729	4890026	4766118	5074193	5385129	5763249	5907731	5685622	5616750

Table 1

Pan American World Airways Economic Analysis

Pan American has committed sixty-two passenger aircraft and five cargo aircraft to the long-range international segment of CRAF. It is one of the largest U.S. flag carriers with a fleet consisting of: forty-five B-747, twelve L-1011-500s, fifty-six B-727s, sixteen DC-10s, and eight B-737s.

The analysis indicates that fuel cost is the dominant variable affecting Pan American's operating margin. GNP, passenger revenue, and freight ton miles in order were the next most significant variables. Any unfavorable trend in either variable would render Pan American's financial solvency (operating margin) questionable. Assuming the current trend continues, the model predicts that Pan Am will only have an operating margin of one percent by 1986. This results in a net operating loss because a ten to twelve percent return on investment is considered reasonable. Loss of Pan American would represent twenty-two percent of the CRAF's aircraft, and approximately twenty-nine percent of its passenger airlift capability.

Certain management actions which could affect operating margin were not considered in the model. These actions include: (1) Fleet reduction--Pan American is in the process of selling some of its B-747's. In addition, the L-1011 fleet is being grounded, and if sold, would cut the total debt in half. (2) Reduction in labor force--Pan American

plans to reduce its labor force by 5,000 through attrition and leaves of absence. (3) Debt restructuring--Pan American could negotiate more favorable agreements with lending institutions.

During December 1982, Pan American's management was able to obtain wage concessions and productivity improvements from its labor force which will amount to an aggragate savings in labor costs of approximately fifteen percent or about 200 million dollars per year until 1985.

Because its major share of flight operation is conducted in the international arena, it is still plagued by high fuel cost averaging $1.0368 per gallon at the end of 1982. The major obstacle to operating profitability continues to be the high cost of jet fuel.

World Airways Economic Analysis

World is one of the largest charter air carriers in the U.S. Its fleet consist of eight DC-10s, four DC-8s, and four B-747s. The company has committed fourteen aircraft to the long-range international segment of CRAF.

Analysis shows that freight ton miles is the most significant variable affecting World's operating margin. In order, the next most significant factors are: GNP, fuel cost, and passenger revenue. Assuming the current trend continues, World will have a debt-to-equity ratio of .01 by 1984. This represents a .09 drop from its current ratio. By any accounting standard, World is in imminent

danger of bankruptcy. Loss of World would represent twelve percent of the CRAF's freight capability.

Factors not analyzed which could improve the financial picture are: (1) Increase in military charter service (twenty-five percent of World's income was generated from military charter in 1981, down from thirty-two percent in 1980). (2) Increased emphasis on scheduled air services (currently, only fifty percent of its revenue is generated from scheduled service). (3) Restructuring debt agreements with aircraft lenders and leasors.

Continental Airlines Economic Analysis

Texas Air Corporation is a holding company with a combined fleet of aircraft as follows: thirteen DC-10s, fifty-one DC-9s, and sixty B-727s. One of its subsidaries, Continental, has committed thirteen aircraft to the long-range segment of CRAF. Continental was analyzed after its successful merger with Texas Air Corporation.

All data show the company to be a going concern. While 1981 showed only a .5% operating margin, it can be considered a spurious event driven by the acquisition of a new subsidary. The relatively young fleet (five years) suggest that no new aircraft will be needed in the near term, further enhancing financial solvency.

United Airlines Economic Analysis

United Airlines is a minimum support member of CRAF; however, it has a substantial fleet of wide bodied aircraft

with the potential for airlift in a national emergency. The fleet consist of eighteen B-747s, forty-six DC-10s, forty-four DC-8s, 158 B-737s, two B-767s, and on order are one DC-10 and seventeen B-767s.

The analysis predicts that United will continue to be a going concern. There are two factors which were not included in the analysis which further support its economic vitality. (1) United's major hub was most affected by the controller strike. It is anticipated that departures will increase by twelve percent when controllers return to full strength. (2) It is a diversified company with twelve percent of its revenues generated from hotels and business services.

Flying Tigers Economic Analysis

Tiger International Incorporated, a holding company, owns Flying Tiger Line, the world's largest scheduled air cargo carrier. The carrier serves Asia, United States, and Europe. It operates twenty-four DC-8Fs, thirteen B-747Fs and the average fleet age is seven years.

Flying Tigers has committed its entire fleet to the CRAF. It has the single largest cargo capability providing more than 4.37 million ton miles per day and thirty-one percent of the CRAF cargo airlift.

The 1982 calendar year was the company's worst on record with an estimated deficit of $4.00 per share and little prospect is held for improvement during 1983.

The company announced on February 21, 1983 that it was

unilaterally suspending payments on about half of its total debt of $1.8 billion, which some analysts view as a technical default on loans.

A company spokesperson indicated their mounting problems result from significant MAC contract business reduction, recent acquisition of Seaboard World Airline, deregulation of air cargo operations, the recession, high fuel prices and interest rates.

Computer analysis of Tiger International (TI) shows fuel cost to be the single most significant variable affecting operating margin, followed by GNP, passenger revenue, and freight tons.

In view of the volatility of fuel cost, a credible prediction of bankruptcy as a function of operating margin was difficult. However, the model determined the following relationship between fuel cost and operating margin:

- Historical relationship (TI from 1972 to 1981) is hyperbolic with the function: $Y = {}^{1}/(A + B X)$. Where operating margin (Y) = ${}^{1}/[.01838 + .04037 \text{ (Fuel Cost)}]$.

- Example: A change of two cents per gallon in fuel cost will affect TI's operating margin by eight percentage points. (For detailed analysis, see Appendix I.)

Should the Flying Tiger Line be forced to suspend operation, it would create a void in CRAF cargo capability which could not be filled and would result in drastic shortfalls in cargo airlift.

Chart 1

MAJORS-DOMESTIC OPERATIONS RPM's (Scheduled Service)

PERCENT CHANGE OVER COMPARABLE QUARTER A YEAR EARLIER

Quarterly Data

Summary of Individual Airline Analysis

Of the four variables analyzed to determine their affect on operating margin, GNP and fuel cost were clearly dominant. GNP is a complex variable in that many sub-elements determine its index (interest rate, unemployment, etc.). Therefore resolution of GNP as a causal factor is long term and multi-faceted. Fuel cost, on the other hand, is amenable to near term solution. Fuel cost was one of the major determinents of operating margin even for the two companies determined to be financially stable. (Reference Table 1.) Recent predictions in Aviation Week and Space Technology suggest that,

> failure of Organization of Petroleum Exporting Countries to fix production quotas will help reduce operating cost. A one percent decrease in the price of a gallon of aviation fuel saves U.S. airlines $100 million a year. In the aggregrate, fuel accounts for thirty percent of the operating cost of airlines. Demand for aviation fuel is expected to grow more slowly than air traffic through the 1990s because of conservation, improvements in technology and other measures.[24]

The analysis suggest that if the Federal Government elects to support financial stability of U.S. airlines, the highest and most immediate return on investment would come from direct subsidies to airlines toward fuel costs.

Disposition of Aircarrier Assets

Disposition of a bankrupt airline's assets is achieved

by various means. The Braniff litigation is probably typical of asset disposition.

Litigation involving disputes between government agencies, potential purchaser of equipment, and competitors is delaying the sale of most of Braniff's equipment to more than twelve months. After about eight months of negotiating, Pacific Southwest Airline (PSA), the first lease candidate for most of the equipment, has dropped plans for acquiring the aircraft. Twelve months after Braniff's failure, People Express, a new airline, will begin taking delivery on the first of twenty aircraft to be delivered over the next eighteen months. Neither PSA nor People Express are CRAF participants.

Braniff did not own all of its airplanes. Eleven were owned by Braniff Realty Corporation, a subsidiary of Braniff International who leased them to the airline. These aircraft were repossessed following Braniff's declaration of bankruptcy. This group of airplanes is being remarketed.[25] All the wide-body aircraft that had been assigned to the CRAF except for one were sold to foreign sources--some to communist countries. These wide-body sales are lost to the CRAF.

The current recession has stymied the resale of many of the aircraft. As of 17 January 1983, there remained seventy aircraft for sale or lease.[26] Most of these aircraft are stored in an arid location at Mariana, Arizona. In this environment, aircraft systems and hull deterioration are

kept to a minimum. Engines are started periodically to keep them in a minimum serviceable condition. These aircraft are not, however, maintained to manufacturers' or Federal Aviation Agency (FAA) specifications. It is estimated that these aircraft will require approximately two weeks preparation to meet flight standards.[27]

Older aircraft, those that were inefficient or approaching the end of their usefulness, are parked on a Dallas-Fort Worth airport ramp. Here, aircraft are cannibalized, sold for scrap or put in storage without consideration for preservation or future use. These aircraft are lost assets.[28]

While the disposition of aircraft and equipment has been a problem for Braniff, the opposite has been true regarding its divestment of its international infrastructure. Some of Braniff's international long-range aircraft and routes were sold even before bankruptcy was declared. This was done in an effort to remain solvent. Even during this recession there was strong competition for the South American routes. Four airlines, Air Florida, Eastern, Continental and Pan American, requested CAB permission to take over some of these routes.[29]

It should be noted that in the past twelve months, both World and Pan American are likewise attempting to sell aircraft. Within the past year World sold one B-747-100F and a DC-10-30CF. Pan American is trying to divest itself of its six B-747 freighters and all twelve of its L-1011s.

The recession has made it difficult for Pan American to sell airplanes. But if Pan American is forced to withdraw from some of its markets, stronger U.S. carriers may assume them, as the carriers did prior to and after the Braniff failure. The new airlines' operation of the routes and stations would provide the international infrastructure which is important to a CRAF Phase III operation. The assumption of the infrastructure by the stronger airline, in turn, gives impetus to the purchase of some of the failed carrier aircraft.

Most of the many airlines have experienced difficulty in obtaining capital to acquire new aircraft because of the world-wide recession, high interest rates, and poor airline profit potential. This situation has caused the U.S. air carrier industry to seek capital from foreign sources which removes ownership and control of assets from the United States. Foreign financing and ownership has created a need to review what stipulations may be imposed on the carrier and the government's use of these assets for the implementation of foreign policy or use for national defense purposes. Some of the present financial agreements preclude using aircraft in a war zone, thus removing a potential resource for the CRAF. Consequently, all CRAF commitments require a trilateral agreement between MAC, the air carrier, and the financial institution before assignment can be made to the CRAF fleet.[30] If the lender's consent to allow the aircraft

SUMMARY OF AIRLINE SOLVENCY VARIABLES

INDEPENDENT VARIABLE	DEPENDENT VARIABLE: TOTAL OPERATING REVENUE			GROSS PROFITS		
	R	R^2	SE	R	R^2	SE
REVENUE PASSENGER LOAD FACTOR	.78	.61	.60	.83	.69	.55
TON MILES (FREIGHT)	.83	.68	.53	.90	.80	.44
REVENUE PASSENGERS	.91	.82	.39	.91	.83	.41
NUMBER OF AIRCRAFT	.79	.62	.58	.69	.47	.72
FUEL COST	.95	.89	.31	.88	.78	.47
GROSS NATIONAL PRODUCT	.99	.98	.13	.97	.94	.24
INTEREST RATE	.85	.72	.50	.82	.68	.56
FEDERAL SUBSIDY	.80	.65	.57	.78	.61	.62

NOTE: See explanation of process used in analysis in Appendix K.

R^2 = prediction accuracy and strength of linear association.

R = the degree of correlation between two variables.

SE = (standard error) accuracy of the prediction equation.

Table 2

in war zones is not specified in the lien, a consent agreement must be secured prior to CRAF membership authorization.[31]

The Department of Defense is investigating the possibility of acquiring aircraft from the large supply of surplus wide-body civil aircraft.[32] If this concept is accepted and incorporated, future bankrupt assets would be prime consideration for this fleet.

Plans to Sustain CRAF in the Event of Airline Failures

Currently, there are no contingency plans for dealing with the bankruptcy of a major CRAF carrier. Information obtained from Military Airlift Command and Pentagon agencies responsible for monitoring civil carrier airlift capability committed to the CRAF confirm that no plan exists to cover the shortfall created by a participater's bankruptcy. The financial collapse of any major carrier with the magnitude of resources of Pan Am, World, or Flying Tigers, would have an adverse effect upon the CRAF utility. Beyond loss of aircraft, crew currency would expire within a short period (completely within ninety days) and there would be the loss of the airlines infrastructure critical to supporting international operations.[33]

One solution with severe shortcomings is the use of civil aircraft not designated to the CRAF which can be obtained during a declared emergency or nuclear attack under the provision of the Defense Production Act of 1950. These airlift assets are allocated to the War Airlift Services Program

(WASP) (Reference Appendix H). Available aircraft assets can provide substantial passenger airlift capability but little additional cargo capacity for bulk or oversize cargo suitable for international long range operations. Additionally, the WASP resources would have limited usefulness for extended overwater operation without Federal Aviation Agency waiver or aircraft modification.

The limitations which preclude the usefulness of the WASP resources for strategic airlift for DOD requirements are:

1. Aircraft not configured with required navigation and communication equipment.

2. Aircrew not qualified for overwater operations.

3. FAA restrictions prohibiting use of certain two and three engine aircraft more than ninety minutes off-shore.

4. Limited availability of cargo capable aircraft or cargo convertible capability to carry bulk or oversize cargo.

5. Aircraft not equipped with required emergency survival equipment for extended overwater operation.

6. Use of aircraft resource use must be coordinated in consonance with other government agencies.

Others are:

1. NATO civil airlift augmentation.

2. Korean airlift agreement.

3. Japanese airlift agreement.

The WASP is the only plan in addition to the CRAF which provides emergency airlift. It was neither intended to

function in lieu of the CRAF nor to sustain operations should the CRAF lose sustantial airlift resources. The WASP is time consuming to implement and too inflexible to DOD mission control to be a valid alternative for the airlift shortfall created by an air carrier failure. It can, however, become a potential source of emergency airlift.

Another source of airlift may be the employment of foreign carriers. The JCS report on military posture for FY 83 states, "NATO countries have committed long-range cargo aircraft to transport U.S. reinforcements to Europe in the event of war. Similar commitments by other countries are being pursued." The European response for airlift into areas of low European interest or concern is questionable, however.

In summary, if a major airline in the CRAF fails, plans do not exist to sustain the CRAF airlift capability to enable the flexibility of operation and mission control. Military airlift is therefore vulnerable to increased shortfalls in view of the economic state of several major carriers.

Summary

Several major contributors to the Civil Reserve Air Fleet (CRAF) are clearly nearing bankruptcy, but no plans exist to assure the current airlift shortfall is not further exacerbated by airline failures.

There is no guarantee that assets would remain in the CRAF after bankruptcy is declared; we found that the Braniff aircraft were not. Also, assets would remain in the control of the Federal Bankruptcy Court until litigation could be resolved. Long litigation delays would present a problem if bankruptcy was declared shortly before the CRAF was activated for war.

The United States could lose twenty-nine percent of CRAF passenger capability if Pan Am failed, twelve percent of CRAF cargo capability if World failed, and thirty-one percent of CRAF cargo capacity if Flying Tigers failed.

Some aircraft owned by U.S. carriers not in CRAF are capable of filling the passenger requirement, but these would only provide for twenty-five percent of Pan Am's loss. Beyond Western and Delta's long-range international fleet, there are 142 other U.S. wide-body passenger aircraft which are not in the CRAF because they are not configured with communication/ navigation equipment required for extended overwater routes. (Appendix C; page 12) There is no available wide-body cargo aircraft to fill a void created by the failure of World Airways or Flying Tigers.

The WASP, Foreign Carriers, and Leasing options could potentially minimize the effect of airline failures on airlift in a national emergency. However, none offer the needed flexibility and controlability required to assure timely response of men and their equipment.

We conclude that there is no substitute for contingency plans to assure continued airlift support given an airline bankruptcy.

be made prior to purchase and lease of aircraft.

Summary

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CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS

Based upon the lack of plans to assure continuity of airlift in the event of airline bankruptcy and the negative financial trends in the industry which may result in a major air carrier failure, we propose the following:

1. Conclusion: Contingency plans do not exist to assure airlift capability in the event of a major airline bankruptcy.

Recommendation: A single federal agency should be appointed to lead development of contingency plans for this possibility. We believe this should be the Department of Defense with MAC as its agent. A CRAF emergency action group should be established within MAC to immediately draw assets into CRAF once a CRAF carrier fails.

2. Conclusion: Authority for control of airlift assets is fragmented among many agencies, with little apparent coordinated structure.

Recommendation: A federal agency should be designated as the single manager for coordination and allocation of airlift resources in a national emergency.

3. Conclusion: Consideration has not been given to preserving a major carrier's CRAF assets when a bankruptcy occurs. This would be most important if the bankruptcy coincides with heightened U.S. military action which required or potentially required significant CRAF airlift.

by the failure of World Airways or Flying Tigers.

The WASP, Foreign Carriers, and Leasing options could potentially minimize the effect of airline failures on airlift in a national emergency. However, none offer the needed flexibility and controlability required to assure timely response of men and their equipment.

We conclude that there is no substitute for contingency plans to assure continued airlift support given an airline bankruptcy.

required navigation equipment installed and which are not included in the CRAF.

Recommendation: We recommend the Congress appropriate funds so these aircraft can be installed with the required equipment for extended overwater routes thus providing for shortfalls created by a possible CRAF air carrier failure.

5. Conclusion: Many B-767s will enter the U.S. air carrier inventory as the fleet of jumbo size aircraft decreases. Two engine aircraft are not currently certified for extended overwater flights. Provisions could be made for Stage III operations waiver from the FAA. FAA rule making personnel indicate that in a declared war scenario, the two engine overwater waiver could be quickly approved.

Recommendation: FAA should review its restrictions pertaining to two engine extended overwater operation and formulate plans to provide immediate waviers during emergency airlift operations.

6. Conclusion: The Department of Defense (DOD) has gained support from allies to augment the airlift of U.S. supplies and personnel with their civil air fleets. The U.S. Government could reduce its vulnerability to shortages of airlift capability by obtaining additional commitments from other friendly foreign governments to provide this vital service as part of their national defense contribution.

Recommendation: Additional civil aircraft assets from allied nations be negotiated to formulate a plan supplementing U.S. emergency airlift needs.

7. Conclusion: The DOD required airlift in a CMMS scenario is short thirty-three million ton-miles per day.

Recommendation: To reduce the additional effect of a failed carrier's lost assets to CRAF, consideration should be given to the purchase and modification of available wide-body aircraft to the organic fleet of the Military Airlift Command (MAC). These aircraft are available because of the industry's surplus capacity, deteriorating financial conditions, and inability to dispose of assets during a period of negative economic growth. We recommend DOD consider acquiring these readily available assets at comparatively advantageous costs to provide an additional airlift capacity.

8. Conclusion: Our analysis shows fuel cost to be the single most significant variable affecting financial solvency of some airlines. The federal government currently subsidizes the domestic airline industry via the Civil Aeronautics Board; however, only a small percentage is paid directly to air carriers. For example, in 1981, $114.5 million of $3.8 billion allocated to the Civil Aeronautics Board was paid to air carriers.[1]

Recommendation: To ensure financial stability of an industry critically important to national defense, airline survivability would be greatly enhanced if more funds were

allocated to both domestic and international carriers to offset fuel costs.

9. Conclusion: All civil aircraft not assigned to the CRAF are placed in the War Air Service Program (WASP). (See Appendix H) Our investigation revealed this airlift capacity is neither identified nor tracked as promulgated by the most current WASP Manual (April 1971).

Recommendation: We recommend the update, revision, and reaffirmation of the National Airlift Policy at the national level between the Department of Defense and the Department of Transportation. The objective should be to formulate a plan which assigns specific available civil resources for designating military use and control of WASP assets to sustain the CRAF in the event of a major air carrier failure. A constructive and effective program which allocates resources to various government agencies prior to the event of a national emergency would provide an efficient, timely, and smooth transition to those government agencies if required. Current public law and Presidential executive order authorize the requisition and allocation of airline assets but current plans are outdated, cumbersome, and unrealistic for efficient implementation.

APPENDIX A

EXPLANATION OF TERMS

1. Correlation coefficient (R). A high correlation between two variables tells us an association exists. Causation may or may not be involved. It measures the degree to which the relationship can be represented by a straight line. The value of R ranges from +1.00 to -1.00, where ± 1 represents a perfect linear relationship. The value of R is computed in the following manner:

$$R_{x\,y} = \frac{\sum xy - (x\,y)}{\sqrt{[\sum x^2 - n\,(x)^2]\,[y^2 - n\,(\bar{y})^2]}}$$

R = correlation coefficient

x & y = individual variable values

$\sum$ = summation sign

n = number of cases

$\bar{x}$ & $\bar{y}$ = mean values

When R equals .60 or above, R is considered to be a significant correlations.

2. Coefficient of determination (R) indicates the percentage of variance in one variable accounted for explained by variance in the other.

3. Standard error (SE) of the estimate tells how much the correlation deviates from a straight line relationship: It measures the overall accuracy of the prediction equation where:

$$SE = \sqrt{\frac{(y - \hat{y})^2}{n - 2}}$$

$\hat{y}$ = predicted value

4. The F test (goodness of fit test) indicates whether the (assumed random) sample of observations being analyzed has been drawn from a population in which the multiple correlation is equal to zero, and that any observed correlation is due to sampling fluctuation or measurement error.

$$\text{where } F = \frac{\text{SS reg}/K}{\text{SS res}/(n - K - 1)}$$

SS reg = sum of square explained by regression equation

K = degrees of freedom (number of independent variables)

SS res = residuals (unexplained) sum of squares

5. Operating margin - within the air transport industry, defined as operating income (after all operating expense, but before depreciation), as a precentage of gross revenues.

6. Debt / equity ratio - this is the measurement of a company's long term debt, including long term leases, relative to its equity (net worth). The ratio measures the degree to which a firm is leveraged to indicate the extent which it is financing operations and new investment through external sources.

MONTHLY CIVIL RESERVE AIR FLEET (CRAF) CAPABILITY SUMMARY

HQ MAC/XPD

1 January 1983

DOMESTIC SEGMENT

AIRLINE AND CRAF STAGE	EVERGREEN (EIA)	TRANS AMERICA (TIA)	ZANTOP (ZIA)	TOTAL
AIRCRAFT TYPE	I II III	I II III	I II III	II III
B727-QC				
B727-200C				
C-46				
DC-8 50CF	7 7			7 7
L-188C	10 10	5 5	6 6	15 15
L-100-30		6 6	6 6	12 12
DC-8-50F				
TOTALS	7 7	11 11	6 6 6 6	30 30

ALASKAN SEGMENT

AIRLINE AND CRAF STAGE	ALASKA INTL (AIA)	REEVE ALEUTIAN (RAA)	WIEN ALASKA (WCA)	TOTAL
AIRCRAFT TYPE	II III	II III	II III	II III
B727-QC				
B727-200C			5	5
C-46				
DC-8 50CF	4	2		2
L-188C				
L-100-30				
DC-8-50F				
TOTALS	4	2	5	11

SHORT-RANGE INTERNATIONAL SEGMENT

AIRLINE AND CRAF STAGE	CONTINENTAL (CAL)	EASTERN (EAL)	PAN AMERICAN (PAA)	UNITED (UAL)	TOTAL
AIRCRAFT TYPE	II III	II III	II III	II III	II III
B727-QC	2	○	○		2
B727-200C					
C-46					
DC-8 50CF					
L-188C					
L-100-30				14	14
DC-8-50F					
TOTALS	2			14	16

CAPABILITY

TYPE	STAGES II	STAGES III
DOMESTIC CARGO CAPABILITY (BTB)	3 430	3 430
DOMESTIC PASSENGER CAPABILITY (BPB)		
ALASKAN CARGO CAPABILITY (BTB)		524
SHORT-RANGE CARGO CAPABILITY (BTB)		938

LONG-RANGE INTERNATIONAL SEGMENT

AIRLINE AND CRAF STAGE	AIRLIFT (ROL)	AMERICAN (AAL)#	ARROW (ARW)	CAPITOL (CAP)	CONTINENTAL (CAL)#	EVERGREEN (EIA)	FLYING TIGER (FTL)	GLOBAL (GTA)	NORTHWEST (NWA)	OVERSEAS NATIONAL (ONA)	PAN AMERICAN (PAA)	RITER (RTL) (RIA)	TRANSAMERICA (TIA)	TRANS WORLD (TWA)#	UNITED (UAL)
AIRCRAFT TYPE	I II III	I II III	I II III	I II III	I II III	I II III	I II III	I II III	I II III	I II III	I II III	I II III	I II III	I II III	I II III
B707															
B747/B787SP		(△)							6 7 8		1 10 39				18 2 (△)
DC-8				3 4	6										
DC-10		20					1 3		3 7 22						1 5 15
L-1011											1 12				11
TOTAL		20		5	9		1 3	1 1 2	3 8 46		1 11 62				29 1 7 33
B707-300F			5 5 8												
B707-300C		6									2 2 6				
B707-100F							9 9 10		3 3 5		2 2 1				
B747-200F															
B747-200C															
DC-8 63F															
DC-8 50CF	1 1 2									1 1 1					
DC-8 50CF			2 2 2							1 1 1					
DC-8 61CF						1	2								
DC-8 62CF				1											
DC-8 63F															
DC-10 53CF/73CF				2 2 3		1 1 1	3 3 6								
DC-10 10CF					6		1								
DC-10 30CF															
TOTAL	1 1 2	6	7 7 13	2 2 3	4 1 1 2	12 12 35	1 7 2	3 3 5	2 2 3	3 3 5	1 1 1	7 7 18			1
GRAND TOTAL	1 1 2	34	7 7 13	2 2 8	13 1 1 2	12 13 38	1 1 2	4 11 51	2 2 3	4 14 67	1 1 1	7 7 18		29 1 7 34	

AIRLINE AND CRAF STAGE	WORLD (WPL)	ZANTOP (ZIA)#	APPLICATION BY STAGE: PASSENGER	CONVERTIBLE	FREIGHTER	TOTAL EACH STAGE
AIRCRAFT TYPE	I II III	I II III	I II III	I II III	I II III	I II III
B707						
B747/B787SP			1 19 110			1 19 110
DC-8						
DC-10			2 7 76			2 7 76
L-1011			1 23			1 23
TOTAL			3 27 215			3 27 215
B707-300F				5 5 8	1 1 2	5 5 8
B707-300C					2 2 13	2 2 13
B747-100F					13 13 16	13 13 16
B747-200F				3 3 5		3 3 5
B747-200C		2			1 1 1	1 1 1
DC-8 63F					2 2 4	2 2 4
DC-8 50CF		1		3 3 3		3 3 3
DC-8 61CF					8	8
DC-8 62CF					1	1
DC-8 63F						
DC-10 53CF/73CF		4		7 7 11	3 3 6	7 7 11
DC-10 10CF					5	5
DC-10 30CF	7 7 8			7 7 12		7 7 12
TOTAL	7 7 14	3	25 25 73	22 22 42	47 47 115	
GRAND TOTAL	7 7 14	1	3 27 215	25 25 73	22 22 42	50 74 330

CAPABILITY

LONG RANGE	STAGES I	STAGES II	STAGES III
TOTAL PASSENGER AIRCRAFT CAPABILITY (BPB)	1 892	20 195	144 916
WIDE BODY LOWER LOBE BULK CARGO CAPABILITY (BTB)	042	428	2 275
[illegible] WIDE BODY CARGO CAPABILITY (BTB)	2 598	2 598	4 964
(OVERSIZE)	(3 047)	(3 047)	16 164
WIDE BODY CARGO CAPABILITY (BTB)	4 730	4 730	9 152
TOTAL LONG RANGE CARGO CAPABILITY (BTB)	6 370	6 756	16 [illegible]
(△ - Refueled)			

SUMMARY OF SEGMENTS

DOMESTIC		30	30
ALASKAN			33
SHORT-RANGE INTERNATIONAL			16
LONG-RANGE INTERNATIONAL (PAX)	3	27	215
LONG-RANGE INTERNATIONAL (CARGO)	47	47	115
TOTAL CRAF	50	104	387

REMARKS

CARRIER	NO	TYPE AIRCRAFT	REG NO	ACTION
EAL	9	B727-25C	81816, 81526, 81676	DROP SRI
PAA	2	B727-21C	339PA, 340PA	DROP SRI

NOTES

Call contract

Capability reflected in millions of ton-n passenger miles (BTB or BPB) per day

Cargo capability based on CRAF ten-hour planning payload (APP 76-3)

○ Indicates changes since previous capability summary

△ Potential emergency bulk cargo capability [illegible]

Rev. Date 1 Jan 82

SUMMARY OF JET AIRCRAFT IN SERVICE

AIRCRAFT TYPE & MODEL	IN SVC	AIRLINE, OWNER OR OPERATOR	Number Allocated to CRAF	Number Retained in WASP	WASP Acft Capable of Domestic Operations Only	Domestic WASP Acft Potentially Capable of Over Water Operations[3]	
						Short Range[1]	Long Range[2]
AIRBUS IND.A300B2-200	2	EASTERN AIRLINES -EAL		2			
AIRBUS IND.A300B4-100	17	EASTERN AIRLINES -EAL		17			
AIRBUS IND.A300B4-200	6	EASTERN AIRLINES -EAL		6			
TYPE TOTALS	25		0	25	0	25	0
BAC(BAE) 111-200	1	PACIFIC EXPRESS		1	1		
	28	US AIR		28	28		
TOTALS	29						
BAC(BAE) 111-400	1	MFR: GAC-GULFSTREAM AM.		1	1		
TOTALS	1						
TYPE TOTALS	30		0	30	30	0	0
BOEING 707-120B	4	AMERICAN TRANS AIR		4			4
	1	GUY-AMERICAN AIRWAYS		1			1
	30	TRANS WORLD AIRLINES-TWA		30			30
MODEL TOTALS	35		0	35	0	0	35
BOEING 707-320	1	INTERCONTINENTAL AIRWAYS		1			1
BOEING 707-320B	1	ARROW AIRWAYS		1			1
	2	GLOBAL INTERNATIONAL AIRLINES		2			2
	1	GUY-AMERICA AIRWAYS		1			1
	1	SOUTH PACIFIC ISLAND AIRWAYS		1			1
	22	TRANS WORLD AIRLINES-TWA		22			22
TOTALS	28		0	28	0	0	28
BOEING 707-320C	4	ARROW	4				
TOTALS	4		4	0	0	0	0
PAGE TOTAL			4	118	30	25	63

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SUMMARY OF JET AIRCRAFT IN SERVICE

AIRCRAFT TYPE & MODEL	IN SVC	AIRLINE, OWNER OR OPERATOR	Number Allocated to CRAF	Number Retained in WASP	WASP Acft Capable of Domestic Operations Only	Domestic WASP Acft Potentially Capable of Over Water Operations[3]	
						Short Range[1]	Long Range[2]
BOEING 727-200 ADV	5	AIR FLORIDA		5		5	
	6	ALASKA AIRLINES		6		6	
	83	AMERICAN AIRLINES-AAL		83		83	
	23	CONTINENTAL AIRLINES-CAL		23		23	
	116	DELTA AIRLINES - DAL		116		116	
	58	EASTERN AIRLINES - EAL		58		58	
	29	NORTHWEST ORIENT AIRLINES NWA		29		29	
	9	PACIFIC SOUTHWEST AIRLINE PSA		9		9	
	4	PAN AMERICAN WORLD AIRWAYS - PAA		4		4	
	16	REPUBLIC AIRLINES		16		16	
	20	TRANS WORLD AIRLINES-TWA		20		20	
	76	UNITED AIRLINES - UAL		76		76	
	5	US AIR		5		5	
	41	WESTERN AIRLINES -WAL		41		41	
TOTALS	491		0	491	0	491	0
BOEING 737-100	2	AIRCAL		2	2		
	3	AIR FLORIDA		3	3		
	14	PEOPLE EXPRESS		14	14		
MODEL TOTALS	19		0	19	19	0	0
BOEING 737-200	14	AIRCAL		14	14		
	10	AIR FLORIDA		10	10		
	2	ALOHA AIRLINES		2	2		
	3	E G & G		3	3		
	21	FRONTIER AIRLINES		21	21		
	22	PIEDMONT AIRLINES		22	22		
	46	UNITED AIRLINES-UAL		46	46		
	12	WESTERN AIRLINES -WAL		12	12		
	3	WIEN AIR ALASKA		3	3		
TOTALS	133		0	133	133	0	0
BOEING 737-200 ADV	12	AIR FLORIDA		12	12		
	6	ALOHA AIRLINES		6	6		
	24	FRONTIER AIRLINES		24	24		
	21	PIEDMONT AIRLINES		21	21		
	27	SOUTHWEST AIRLINES		27	27		
	0	US AIR					
TOTALS	90		0	90	90	0	0
PAGE TOTAL			0	735	242	491	0

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SUMMARY OF JET AIRCRAFT IN SERVICE

AIRCRAFT TYPE & MODEL	IN SVC	AIRLINE, OWNER OR OPERATOR	Number Allocated to CRAF	Number Retained in WASP	WASP Acft Capable of Domestic Operations Only	Domestic WASP Acft Potentially Capable of Over Water Operations[3]	
						Short Range[1]	Long Range[2]
BOEING 707-320C/ALL-CGO	4	ARROW AIRWAYS	4				
	2	GLOBAL INTERNATIONAL AIRLINES	2				
	1	JET CHARTER SERVICES		1			1
	1	PAN AVIATION		1			1
	1	TRANS WORLD AIRLINES-TWA		1			1
TOTALS	9		6	3	0	0	3
BOEING 720	1	AEROAMERICA		1		1	
TOTALS	1		0	1	0	1	0
BOEING 727-100	2	AEROSTAR		2	2		
	2	ALASKA AIRLINES		2	2		
	53	AMERICAN AIRLINES-AAL		53	53		
	13	CONTINENTAL AIRLINES-CAL		13	13		
	31	EASTERN AIRLINES-EAL		31	31		
	4	NORTHWEST ORIENT AIRLINES-NWA		4	4		
	3	PACIFIC SOUTHWEST AIRLINES-PSA		3	3		
	25	PAN AMERICAN WORLD AIRWAYS-PAA		25	25		
	2	PAN AVIATION		2	2		
	6	PIEDMONT AIRLINES		6	6		
	1	T-BIRD AIR-THUNDERBIRD AIRWAYS		1	1		
	26	TRANS WORLD AIRLINES-TWA		26	26		
	26	UNITED AIRLINES - UAL		26	26		
	10	US AIR		10	10		
	8	MFR: BCAC -BOEING COML AIRPLANE		8	8		
TOTALS	212		0	212	212	0	0
PAGE TOTAL			6	216	212	1	3

Rev. Date SUMMARY OF JET AIRCRAFT IN SERVICE
1 Jan 82

AIRCRAFT TYPE & MODEL	IN SVC	AIRLINE, OWNER OR OPERATOR	Number Allocated to CRAF	Number Retained in WASP	WASP Acft Capable of Domestic Operations Only	Domestic WASP Acft Potentially Capable of Over Water Operations[3]	
						Short Range[1]	Long Range[2]
BOEING 727-100C	1	AIR EXPRESS INTERNATIONAL		1		1	
	2	ALASKA AIRLINES		2		2	
	1	AMERICAN AIRLINES-AAL		1		1	
	2	CONTINENTAL AIRLINES-CAL	2			2	
	9	EMERY WORLDWIDE		8		8	
	2	FEDERAL EXPRESS		2		2	
	1	IASCO-INTERNATIONAL AIR SERVICE		1		1	
	4	NORTHWEST ORIENT AIRLINES NWA		4		4	
	2	TRANS WORLD AIRLINES-TWA		2		2	
TOTALS	33		2	21	0	21	0
BOEING 727-100QC	7	EASTERN AIR LINES-EAL		7		7	
	10	EMERY WORLDWIDE		10		10	
	1	AIR [illegible] INTERNATIONAL AIR LINES		1		1	
	28	FEDERAL EXPRESS		28		28	
	2	PAN AMERICAN WORLD AIR-WAYS - PAA		2		2	
	1	PROFIT AIRLINES		1		1	
	1	[illegible] AVIATION		1		1	
	7	UNITED PARCEL SERVICE-UPS		7		7	
	1	[illegible] AIR		1		1	
	5	[illegible] AIR [illegible]		5		5	
TOTALS	63		0	63	0	63	0
BOEING 727-200	42	AMERICAN AIRLINES-AAL		42		42	
	21	CONTINENTAL AIRLINES-CAL		21		21	
	13	DELTA AIRLINES-DAL		13		13	
	34	EASTERN AIRLINES-EAL		34		34	
	23	NORTHWEST ORIENT AIRLINES NWA		23		23	
	6	PACIFIC SOUTHWEST AIRLINES-PSA		6		6	
	24	PAN AMERICAN WORLD AIRWAYS-PAA		24		24	
	4	PIEDMONT AIRLINES		4		4	
	36	TRANS WORLD AIRLINES-TWA		36		36	
	28	UNITED AIRLINES-UAL		28		28	
	6	WESTERN AIRLINES-WAL		6		6	
TOTAL	237		[illegible]	[illegible]	[illegible]	[illegible]	

Rev. Date 1 Jan 82

SUMMARY OF JET AIRCRAFT IN SERVICE

AIRCRAFT TYPE & MODEL	IN SVC	AIRLINE, OWNER OR OPERATOR	Number Allocated to CRAF	Number Retained in WASP	WASP Acft Capable of Domestic Operations Only	Domestic WASP Acft Potentially Capable of Over Water Operations[3]	
						Short Range[1]	Long Range[2]
BOEING 737-200C	4	WIEN AIR ALASKA	0	4	4	0	0
TOTALS	4						
BOEING 737-200C ADV	2	ALASKA AIRLINES	5	2	2	0	0
	5	WIEN AIR ALASKA	5	2	2		
TOTALS	7						
BOEING 747SP	10	PAN AMERICAN WORLD AIRWAYS - PAA	10				
	3	TRANS WORLD AIRLINES-TWA	3				
	1	MFR: BCAC-BOEING COML AIRPLANE	1	1	0	0	1
MODEL TOTALS	14		14	1			1
BOEING 747-100	8	AMERICAN AIRLINES-AAL	8				
	12	NORTHWEST ORIENT AIRLINES NWA	12				
	29	PAN AMERICAN WORLD AIRWAYS-PAA	29				
	15	TRANS WORLD AIRLINES-TWA	15				
	18	UNITED AIRLINES -UAL	18				
	3	FLYING TIGER LINE -FTL	3				
TOTALS	85		85	0	0	0	0
BOEING 747-100 (F)	6	AMERICAN AIRLINES -AAL	6				
	3	FLYING TIGER LINE -FTL	3				
	4	PAN AMERICAN WORLD AIRWAYS-PAA	4				
TOTALS	13		13	0	0	0	0
PAGE TOTAL			116	7	6	0	1

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AIRCRAFT TYPE & MODEL	IN SVC	AIRLINE,OWNER OR OPERATOR	Number Allocated to CRAF	Number Retained in WASP	Capable of Domestic Operations Only	Potentially Capable of Over Water Operations[3]	
						Short Range[1]	Long Range[2]
BOEING 747-200B	3	METRO INTERNATIONAL AIRWAYS		3			3
	12	NORTHWEST ORIENT AIRLINES NWA	12				
	7	MFR: BCAC -BOEING COML AIRPLANE		7			7
MODEL TOTALS	22		12	10	0	0	10
BOEING 747-200C	2	WORLD AIRWAYS	2				
TOTALS	2		2	0	0	0	0
BOEING 747-200C-SCD	3	TRANSAMERICA AIRLINES	3				
TOTALS	3		3	0	0	0	0
BOEING 747-200F	1	MFR: BCAC-BOEING COML AIRPLANE		1			1
TOTALS	1		0	1	0	0	1
BOEING 747-200-SCD	10	FLYING TIGER LINE-FTL	10				
	5	NORTHWEST ORIENT AIRLINES NWA	5				
	1	PAN AMERICAN WORLD AIRWAYS - PAA	1				
TOTALS	16		16	0	0	0	0
LOCKHEED L-1011-1	33	DELTA AIR LINES - DAL		33			33
	31	EASTERN AIR LINES - EAL		31			31
	24	TRANS WORLD AIRLINES-TWA	3	21			21
	1	MFR: LAC-LOCKHEED(AIRCRAFT)		1			1
TOTALS	89						
LOCKHEED L-1011-100	8	TRANS WORLD AIRLINES-TWA	8				
TOTALS	8						
LOCKHEED L-1011-200	1	DELTA AIRLINES-DAL		1			1
TOTALS							
MODEL TOTALS	98						
LOCKHEED L-1011-500	3	DELTA AIRLINES -DAL		3			3
	12	PAN AMERICAN WORLD AIRWAYS-PAA	12				
MODEL TOTALS	15						
TYPE TOTALS	113		23	90	0	0	90
PAGE TOTALS			56	101	0	0	101

Rev. Date 1 Jan 82

SUMMARY OF JET AIRCRAFT IN SERVICE

AIRCRAFT TYPE & MODEL	IN SVC	AIRLINE, OWNER OR OPERATOR	Number Allocated to CRAF	Number Retained in WASP	WASP Acft Capable of Domestic Operations Only	Domestic WASP Acft Potentially Capable of Over Water Operations[3]	
						Short Range[1]	Long Range[2]
MCD DOUGLAS DC-8-50(F)	2	AIR TRANSPORT INTERNATIONAL	2				
	1	OVERSEAS NATIONAL AIRLINES ONA	1				
	1	ZANTOP INTERNATIONAL AIRLINES	1				
TOTALS	4		4	0	0	0	0
MCD DOUGLAS DC-8-61	6	CAPITOL AIR	1	5			5
	13	DELTA AIRLINES - DAL		13			13
	29	UNITED AIRLINES - UAL	5	24			24
TOTALS	48		6	42	0	0	42
MCD DOUGLAS DC-8-61CF	1	EVERGREEN INTERNATIONAL AIRLINES	1				
	5	TRANSAMERICA - TRA	5				
	2	FLYING TIGER LINE - FTL	2				
TOTALS	8		8	0	0	0	0
MCD DOUGLAS DC-8-62CF	1	ARROW	1				
TOTALS	1		1	0	0	0	0
MCD DOUGLAS DC-8-63	1	CAPITOL AIR					
TOTALS	1		0	1	0	0	1
MCD DOUGLAS DC-8-63AF	6	FLYING TIGER LINE - FTL	6				
TOTALS	6		6	0	0	0	0
MCD DOUGLAS DC-8-63CF	2	ARROW AIRWAYS	2				2
	5	CAPITOL AIR	3	2			
	1	EVERGREEN INTERNATIONAL AIRLINES	1				
	13	FLYING TIGER LINE - FTL	13				
	1	METRO INTERNATIONAL AIRWAYS		1			1
	1	OVERSEAS NATIONAL AW - ONA '79	1				
	7	TRANSAMERICA AIRLINES	7				
	4	UNITED PARCEL SERVICES -UPS		4			4
	4	WORLD AIRWAYS	4				
TOTALS	38		31	7	0	0	7
PAGE TOTAL			56	50			50
MODEL TOTALS	106						
TYPE TOTALS	158						

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SUMMARY OF JET AIRCRAFT IN SERVICE

AIRCRAFT TYPE & MODEL	IN SVC	AIRLINE, OWNER OR OPERATOR	Number Allocated to CRAF	Number Retained in WASP	WASP Acft Capable of Domestic Operations Only	Domestic WASP Acft Potentially Capable of Over water Operations[3]	
						Short Range[1]	Long Range[2]
MCD DOUGLAS DC-9-10	1	GREAT AMERICAN AIRWAYS		1	1		
	9	MIDWAY AIRLINES		9	9		
	7	OZARK AIRLINES		7	7		
	28	REPUBLIC AIRLINES		28	28		
	16	TEXAS INTERNATIONAL AIRLINES - TXI		16	16		
TOTALS	61		0	61	61	0	0
MCD DOUGLAS DC-9-10CF	0	AIR FLORIDA					
	5	EMERALD AIRLINES		5	5		
	1	PUROLATOR COURIER		1	1		
	9	REPUBLIC AIRLINES		9	9		
	2	ROSS AVIATION		2	2		
	2	TEXAS INTERNATIONAL AIRLINES - TXI		2	2		
TOTALS	19		0	19	19	0	0
MODEL TOTALS	80						
MCD DOUGLAS DC-9-30	4	AIRBORNE EXPRESS		4	4		
	36	DELTA AIRLINES - DAL		36	36		
	58	EASTERN AIRLINES - EAL		58	58		
	4	MIDWAY AIRLINES		4	4		
	13	NEW YORK AIR		13	13		
	34	OZARK AIR LINES		34	34		
	60	REPUBLIC AIRLINES		60	60		
	20	TEXAS INTERNATIONAL AIRLINES - TXI		20	20		
	63	US AIR		63	63		
TOTALS	292		0	292	292	0	0
MCD DOUGLAS DC-9-30AF	3	EVERGREEN INTERNATIONAL AIRLINES	3				
	1	SUMMIT AIRLINES		1	1		
TOTALS	4		3	1	1	0	0
PAGE TOTALS			3	373	373	0	0

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SUMMARY OF JET AIRCRAFT IN SERVICE

AIRCRAFT TYPE & MODEL	IN SVC	AIRLINE, OWNER OR OPERATOR	Number Allocated to CRAF	Number Retained in WASP	WASP Acft Capable of Domestic Operations Only	Domestic WASP Acft Potentially Capable of Over water Operations[3]	
						Short Range[1]	Long Range[2]
MCD DOUGLAS DC-9-30CF	2	AIRBORNE EXPRESS		2	2		
	3	AMERICAN INTERNATIONAL AIRWAYS		3	3		
	1	OZARK AIRLINES		1	1		
	1	REPUBLIC AIRLINES		1	1		
	1	MFR: MCDD - MCDONNELL DOUGLAS		1	1		
TOTALS	8		0	8	8	0	0
MCD DOUGLAS DC-9-50	21	EASTERN AIRLINES -EAL		21	21		
	2	HAWAIIAN AIRLINES -HAL		2	2		
	28	REPUBLIC AIRLINES		28	28		
TOTALS	51		0	51	51	0	0
MODEL TOTALS	354						
MCD DOUGLAS DC-9 SUPER 80	5	AIRCAL		5	5		
	6	HAWAIIAN AIRLINES - HAL		6	6		
	2	JET AMERICA		2	2		
	2	MUSE AIR		2	2		
	13	PACIFIC SOUTHWEST AIRLINES - PSA		13	13		
	3	REPUBLIC AIRLINES		3	3		
	1	MFR: MCDD - MCDONNELL DOUGLAS		1	1		
TOTALS	32		0	32	32	0	0
MCD DOUGLAS DC-10-10	34	AMERICAN AIRLINES - AAL	20	14			14
	4	CAPITOL AIR	4				
	7	CONTINENTAL AIRLINES-CAL	7				
	11	PAN AMERICAN WORLD AIRWAYS - PAA	11				
	46	UNITED AIRLINES - UAL	10	36			36
	10	WESTERN AIRLINES - WAL	0	10			10
TOTALS	112		52	60	0	0	60
PAGE TOTALS			52	151	91	0	60

Rev. Date 1 Jan 82

SUMMARY OF JET AIRCRAFT IN SERVICE

AIRCRAFT TYPE & MODEL	IN SVC	AIRLINE OWNER OR OPERATOR	Number Allocated to CRAF	Number Retained in WASP	WASP Acft Capable of Domestic Operations Only	Domestic WASP Potentially C of Overwater
						Short Range[1]
MCD DOUGLAS DC-10-10CF	4	CONTINENTAL AIRLINES-CAL	4			
	4	FEDERAL EXPRESS		4		
	1	UNITED AIRLINES -UAL	1			
TOTALS	9		5	4		
MCD DOUGLAS DC-10-30	2	CONTINENTAL AIRLINES-CAL	2			
	4	PAN AMERICAN WORLD AIRWAYS -PAA		4		
	1	WESTERN AIR LINES -WAL		1		
TOTALS	7		2	5		
MCD DOUGLAS DC-10-30CF	2	AIR FLORIDA		2		
	3	TRANSAMERICA AIRLINES	3			
	8	WORLD AIRWAYS	8			
	1	FLYING TIGER LINE -FTL	1			
TOTALS	14		12	2		
MCD DOUGLAS DC-10-40	22	NORTHWEST ORIENT AIRLINES - NWA	22			
TOTALS	22		22			
TYPE TOTALS	161					
PAGE TOTALS			41	11		

Rev. Date 1 Jan 82

SUMMARY OF JET AIRCRAFT IN SERVICE

AIRCRAFT TYPE & MODEL	IN SVC	AIRLINE, OWNER OR OPERATOR	Number Allocated to CRAF	Number Retained in WASP	WASP Aoft Capable of Domestic Operation Only	Domestic WASP Aoft Potentially Capable of Over water Operations[3]	
						Short Range[1]	Long Range[2]
Lockheed L-188C	4	EVERGREEN AIRLINES (EIA)	4				
	5	TRANSAMERICA AIRLINES (TIA)	5				
	6	ZANTOP (ZIA)	6				
	2	REEVE ALEUTIA (RAA)	2				
TYPE TOTAL	17		17				
LOCKHEED L-100-30	12	TRANSAMERICA (TIA)	12				
	4	ALASKA INTERNATIONAL(AIA)	4				
TYPE TOTAL	16		16				
ACCUMULATIVE TOTALS TOTAL U.S. AIR CARRIER FLEET	2498		387	2111	954	863	294

Inventory Data extracted from Lockheed Research and Engineering using CAF Base made on 15 October 1982.

POTENTIAL INTERNATIONAL CARGO CAPABILITY

	Long Range[2] Aircraft	Number Allocated to CRAF	Number Retained in WASP
AIRCRAFT TOTALS	136	115	21
	Short Range[1] Aircraft	**Number Allocated to CRAF**	**Number Retained in WASP**
AIRCRAFT TOTALS	129	54	72

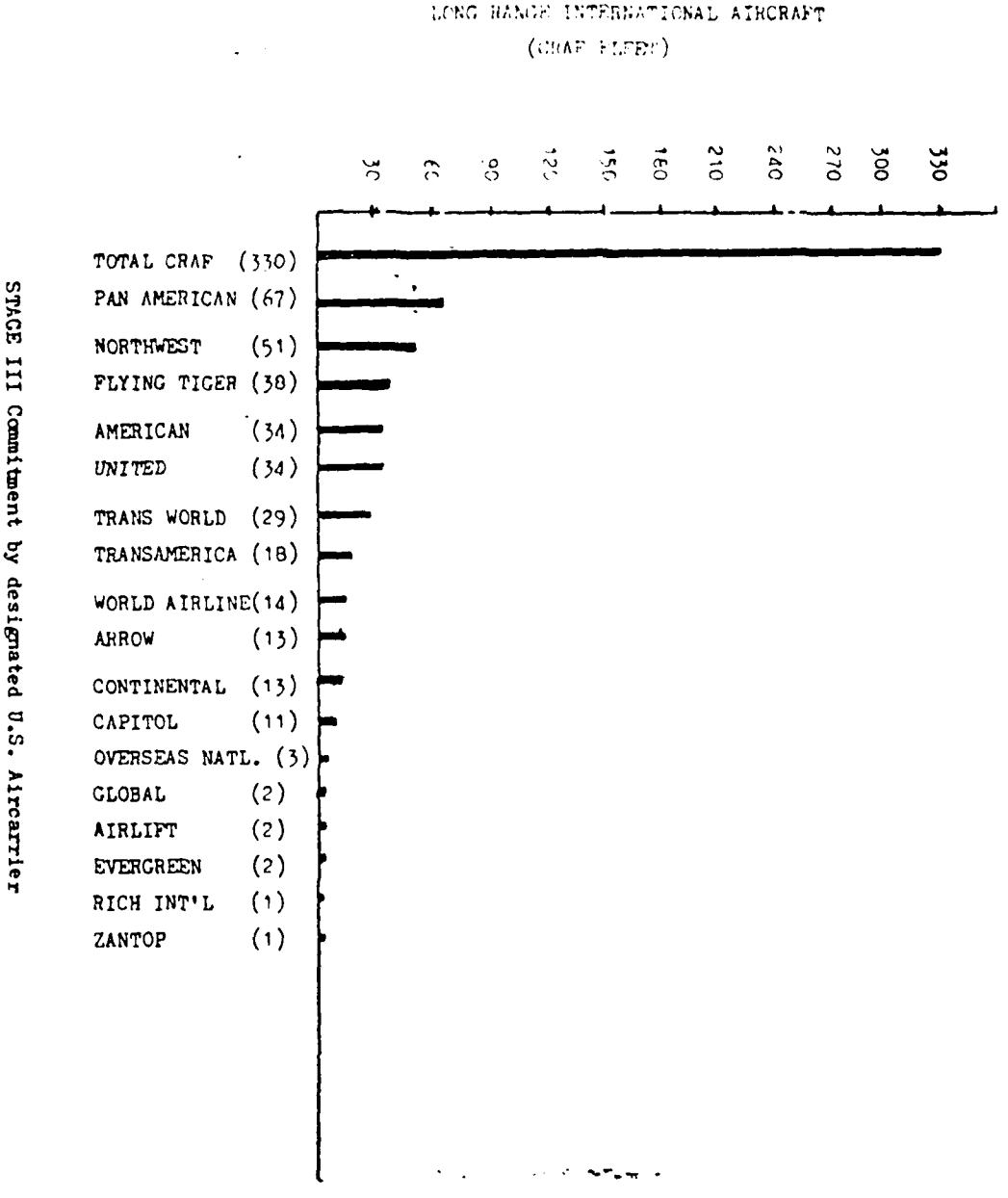
POTENTIAL INTERNATIONAL PAX CAPABILITY

	Long Range[2]	Number Allocated to CRAF	Number Retained in WASP
AIRPLANE TOTALS	349	215	134
	Short Range[1]	**Number Allocated to CRAF**	**Number Retained in WASP**
AIRPLANE TOTALS	760	0	760

1. Less than 1500 nautical miles
2. Greater than 2300 nautical miles
3. Aircraft retained in WASP Fleet have potential use for overwater capability with installation of required communication/navigation and survival equipment and/or FAA wavier for 2/3 engine operation

APPENDIX D

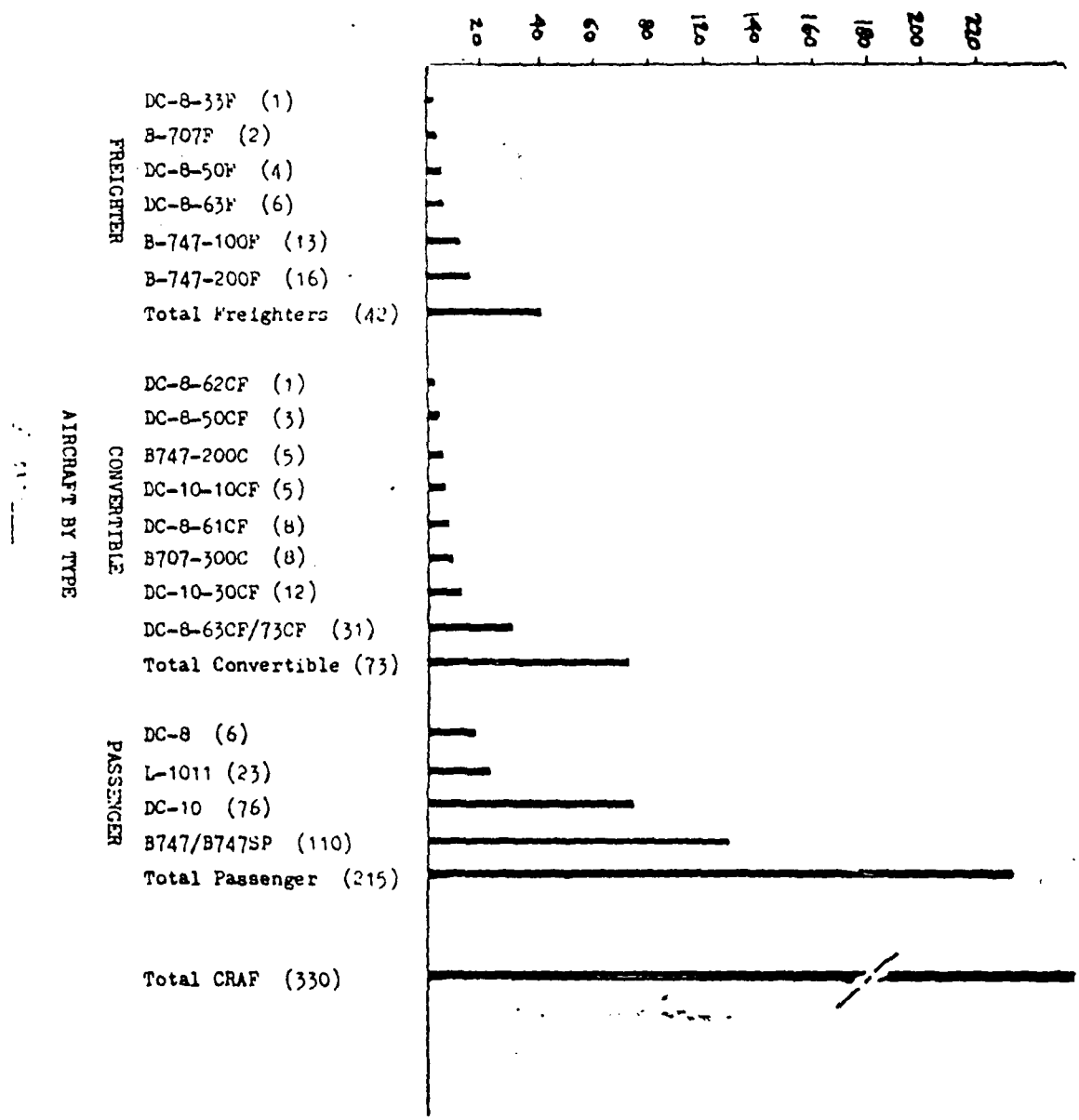
LONG RANGE INTERNATIONAL AIRCRAFT CARRIERS

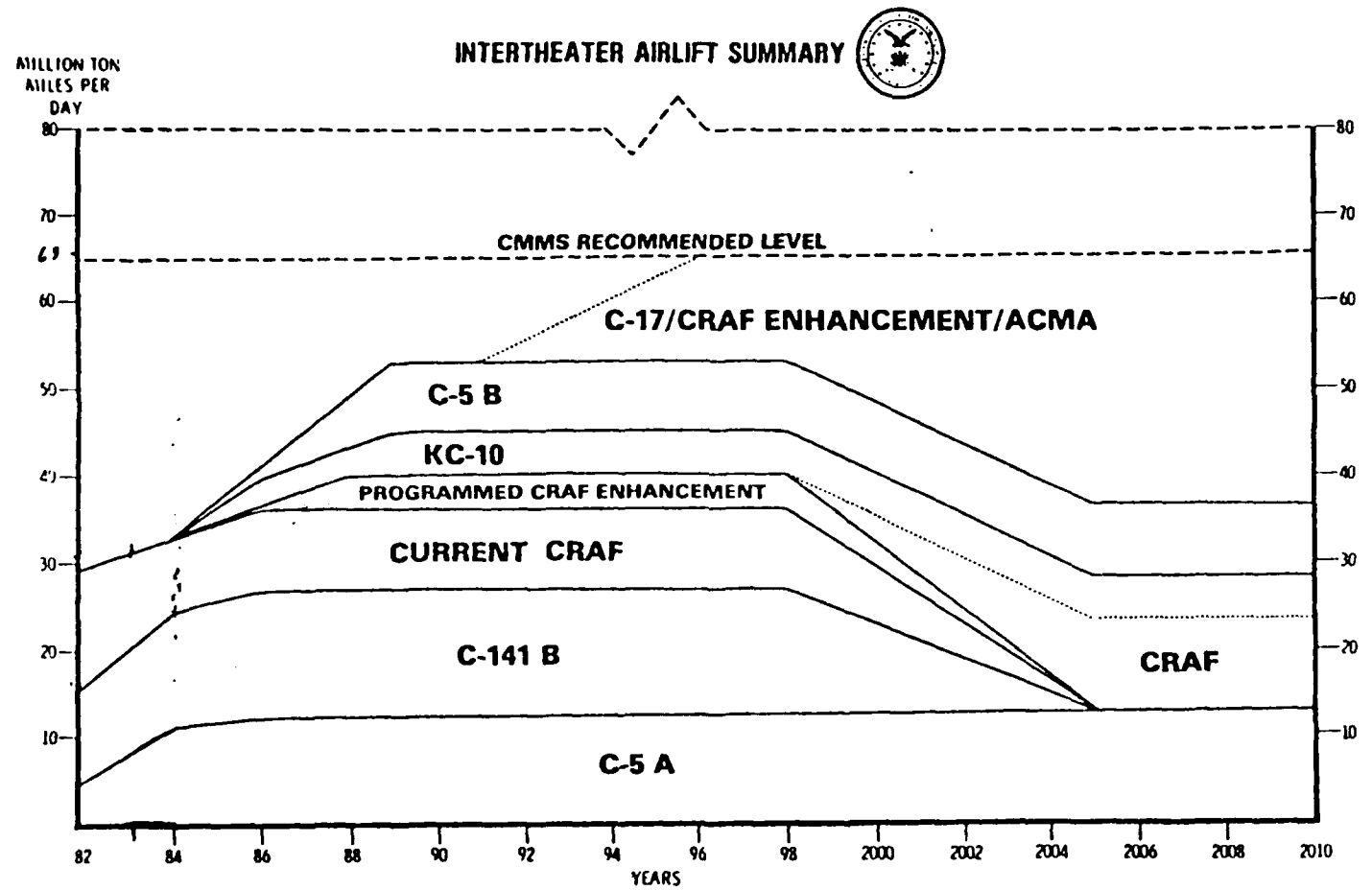


STAGE III Commitment by designated U.S. Aircarrier

LONG RANGE INTERNATIONAL AIRCRAFT

COMMITTED TO CRAF




INTERTHEATER AIRLIFT SUMMARY
MILLION TON MILES PER DAY
80
70
60
50
40
30
20
10
CMMS RECOMMENDED LEVEL
C-17/CRAF ENHANCEMENT/ACMA
C-5 B
KC-10
PROGRAMMED CRAF ENHANCEMENT
CURRENT CRAF
C-141 B
C-5 A
CRAF
82
84
86
88
90
92
94
96
98
2000
2002
2004
2006
2008
2010
YEARS

CIVIL AIRCRAFT WITH INTERTHEATER RANGE (BUT NO COMM-NAV) NOT IN CRAF

CARRIER	TYPE	NUMBER
AMERICAN AIRLINES	DC-10-10	14
DELTA	L-1011-1	33
EASTERN	L-100-1	31
PAN AMERICAN	DC-10-10	4
TRANS WORLD	L-1011-1	24
UNITED	DC-10-10	36
TOTAL		142

Source: LETX/LT COL MURPHY/77332/18 OCT 82

APPENDIX H

EMERGENCY PROCEDURES FOR THE CONTROL OF CIVIL AIR ASSETS

The Department of Transportation (DOT) is responsible for administering civilian and commercial emergency transportation during wars or other emergency conditions involving the United States. During an emergency, the Secretary of Transportation would determine priorities of transportation requests by federal claimants using DOT standby order 1940.4 as the guideline.

Under the provisions of DOT 1940.4, the DOT, in conjunction with the DOD, annually reviews the pre-emergency program. Other federal departments, State, Commerce, Energy, etc., requests for emergency air transportation are reviewed, in addition to the DOD request for CRAF assets from the total U.S. possessed commercial and corporate aircraft. The emergency program to which all civil aircraft are assigned, that are not placed in the CRAF program, is the War Air Service Program (WASP). The WASP is administered and directed by the Civil Aeronautics Board (CAB).

The WASP Manual (April 1971) establishes the policies, procedures, and standards to provide methods for and guidance to accomplish the WASP air priorities functions. Additionally, a WASP Resource Report, issued by the CAB is used as an Emergency Planning Document for implementation of available airlift resources. The last report

published was for 1978.

The assignment of air priorities begins upon the activation of the WASP for both domestic and international routes maintained as part of the WASP. The authority for execution for the WASP is provided by Executive Order 11490, Part I, Sec. 105, assigning specific emergency preparedness functions to the CAB under the coordination authority of the Secretary of Transportation.

A system for priority control of WASP traffic is required in time of emergency because of limited available civil airlift capacity and to assure such traffic moves in accordance with its degree of urgency. Priority of traffic is based strictly on urgency, as related to the national emergency, regardless of Government agency (Department of Defense, Department of State, or Department of Energy) sponsoring the traffic.

The WASP Air Priorities System is world wide in scope. During a national emergency under which it would be implemented, most if not all priority passenger travel and cargo shipments would be directly or indirectly related to government activities in support of the war effort. Priority of movement is not limited to military personnel and equipment, but also includes the movement of civilian and government personnel and equipment which support programs relating to manpower, agriculture, power, health, transportation, etc. Further, the Secretary of Transportation's Standby Order 1940.4 provides the guidance and

procedures governing the establishment of priorities and allocations of civil air carrier capacity.

The WASP Air Priorities System is based on four classes of priority precedences ranging from Class I (highest) to Class 4 (lowest) with determination made as follows.[1]

a. Class I Priority. Traffic which is required of utmost urgency and importance that precedence is given over all other traffic and which under no circumstances should be delayed enroute. The authority to issue Class I priorities is reserved exclusively to the CAB Administrator of Air Priorities.

b. Class 2 Priority. Traffic to meet a destination arrival time for the accomplishment of an urgent objective.

c. Class 3 Priority. Traffic of a less urgent nature to meet a destination arrival time for the accomplishment of an essential objective.

d. Class 4 Priority. Traffic which is eligible for air movement but which does not meet the requirements for movement specified in Classes 1, 2, and 3 above.

An Administrator of Air Priorities is appointed by the WASP Air Priorities Board to implement the policies and procedures they have formulated, and acts as the coordinator for all agencies concerned with civil air priority matters.

[1]CAB, WASP Air Priorities Manual, April 1971, Section 2015.

APPENDIX I

DATA ON U.S. SCHEDULED AIRLINES

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
1. REVENUE PAX LOAD FACTOR (%)	49.7	48.5	53.0	52.1	54.9	53.7	55.4	55.9	61.5	63.0	59.0	58.6
2. FREIGHT TON MILES (000)		3712288	4217452	4736729	4890026	4766118	5074193	5385129	5763249	5907731	5685622	5616750
3. REVENUE PAX (000)		173668	191319	202208	207458	205062	223318	240326	274719	316863	296903	285720
4. TOTAL OPERATING REVENUE (000)		10015577	11163271	12418777	14699125	15355921	17501215	19924800	22883955	27226665	33127806	3649317
5. TOTAL OPERATING EXPENSE (000)		9717102	10578800	11833511	13973385	15228012	16779282	19016760	21519092	27027610	33949421	3691391
6. OPERATING PROFIT (000)		328475	584471	585266	725740	127879	721933	908040	1364863	199055	(221615)	(420741)
7. NET INCOME (000)		28006	214850	226693	321641	(84204)	563354	752536	1196537	346845	17414	(236812)
8. RATE: RET. ON INV. (%)		3.5	4.9	5.1	6.4	2.5	8.0	10.9	13.0	7.0	5.8	5.3
9. # ACFT IN SERVICE		2380	2361	2361	2241	2267	2264	2229	2266	2542	2712	2808
10. FUEL COST (¢)		20¢ E	20¢ E	20¢ E	20¢	25¢	30¢	32¢	37¢	39¢	75¢	90¢
11. CAPACITY (000s) (AVG.)	982	1064	1171	1307	1413	1529	1702	1900	2128	2414	2626	2926 E
12. UNEMPLOYMENT (%)	4.9	4.9	4.9	4.9	5.6	8.59	7.7	7.0	6.0	5.8	7.1	8.3*
13. INTEREST RATES		4.66	4.66	8.20	10.05	6.26	5.24	5.54	7.91	10.97	12.66	16.35
14. FEDERAL SUBSIDY (Millions)		2.2	2.2	2.2	2.2	2.4	2.6	0.6	2.8	3.3	3.4	3.8

* Missing - Crossed (7)
* 1982 - 9.42 (12)

APPENDIX J

ECONOMIC ANALYSIS OF THE U.S. AIRLINE INDUSTRY

An analysis of the economic status of U.S. airlines was made to document the vulnerability of CRAF airlines. The data used represents the major contributing variables to determine a forecast in airline corporate health.

The variables used were:

1. revenue passenger miles load factor
2. freight ton miles
3. revenue passengers
4. total operating revenue
5. total operating expense
6. operating profit
7. net income
8. rate of return on investment
9. number of aircraft in service
10. fuel cost
11. gross national product
12. unemployment rate (national)
13. interest rates
14. federal subsidy

Some elements of operating expense were not included in this regression analysis. They were: labor, travel agent commissions, passenger meals; aircraft maintenance materials, landing fees and advertising.

Various analysis were made using data to determine the most significant contributors to airline solvency. Statistical techniques employed were: stepwise linear regression; cross tabulation, scattergrams, and other tests to determine significance of data. The detail data of each test are included in Appendix K, exhibits 1, 2, and 3.

This research was designed to first examine the financial status of all U.S. air carriers and then examine specific airlines, based on their contribution to the Civil Reserve Air Fleet or their potential for enhancing airlift. All data were analyzed at the ninety-five percent confidence level, using operating revenue as the first dependent variable and net profit as the second dependent variable. They were chosen as representing the ultimate determinant of airline solvency. All variables were separately regressed against the two dependent variables to determine their contribution/ impact on each dependent variable. A summary of the most significant variables is shown in table 2.

From table 2, summary of airline solvency variables, it is clear that GNP, fuel cost, and revenue passengers are the most dominant variables in determining total operating revenue. However, when using gross profits as the dependent variable, the three dominant variables, in order, are GNP, revenue passengers, and freight ton miles. While only the most significant variables are summarized in table 2, financial solvency of U.S. air carriers appears clearly

determined by four variables: GNP, fuel cost, revenue passengers, and freight ton miles. That is, any attempt to improve the financial status of U.S. air carriers could best be done by implementing policies or actions which favorably affect the four variables mentioned above. The analysis also suggests that federal subsidies must increase significantly to affect airline solvency in that federal subsidies had little or no impact on gross profits or operating revenue. If federal subsidies continue at the same nominal level as for the past 11 years (2.8B $/year), a higher payoff, in terms of airline solvency, would be realized if subsidies were applied directly to fuel cost. Fuel cost ranks second among major variables affecting both operating revenue and gross profits.

Gross national product is the single most significant factor affecting total airline solvency. Any favorable change in GNP must of course, result from government actions. The analysis showed unemployment and interest rates to have a minor affect on airline solvency relative to other variables, however; both significantly affect GNP. An improvement in GNP we indicate would result in a multiplicative improvement in airline solvency.

APPENDIX K

EXPLANATION OF REGRESSION PROCESS AND TERMS

Regression is a general statistical technique through which one can analyze the relationship between a dependent or criterion variable (e.g., operating revenue) and a set of independent or predictor variables (e.g., fuel cost, GNP). Regression may be viewed either as a descriptive tool by which the linear dependence of one variable on others is summarized and decomposed, or as an inferential tool by which the relationship in the population are evoluated from the examination of sample data. For purposes of this study, the inferential aspects of regression were used to predict the impact of selected variables on airline operating revenue.

Terms used in the analysis are as follows:

1. regression formula $Y = A + B X$

where: Y = predicted value (i.e. operating revenue)

$$A = \bar{Y} - B \bar{x}$$

$$B = \frac{\sum (x-\bar{x})(y-\bar{y})}{\sum (x-\bar{x})^2} = \frac{SP_{x\,y}}{SS_x}$$ or sum of cross product of x & y / or sum of squares of x

2. R^2 or coefficient of determination: a measure of the prediction accuracy, and the strength of linear association, that is, the ratio of explained variation in the dependent variable Y to the total variation in Y.

$$R^2 = \frac{SS\ reg}{SSy}$$

3. S E or Standard Error of the estimate measures the accuracy of the prediction equation. It is the standard duration of actual Y values from the predicted Y' values.

$$S\ E = \sqrt{\frac{\Sigma(y-y')^2}{N-2}} \quad \text{or} \quad \sqrt{\frac{SS\ res}{N-2}}$$

where: N = sample size

Y' = predicted value

Y = observed value

4. R or correlation coefficient represents the degree of correlation between two variables. Causation may or may not be involved. It measures the degree to which the relationship can be represented by a straight line. The value of R ranges from +1 to -1, where +1 represents a perfect linear relationship. R is the square root of R^2 (coefficient of determination).

5. The F test (goodness of fit test) indicates whether the (assumed random) sample of observations being analyzed has been drawn from a population in which the multiple correlation is equal to zero, and that any observed correlation is due to sampling fluctuation or measurement error.

$$\text{where } F = \frac{SS\ reg/K}{SS\ res/(n - K - 1)}$$

SS reg = sum of square explained by regression equation

K = degrees of freedom (number of independent variables)

SS res = residuals (unexplained) sum of squares

6. Operating margin - within the air transport industry, defined as operatingincome (after all operating expense, but before depreciation), as a precentage of gross revenues.

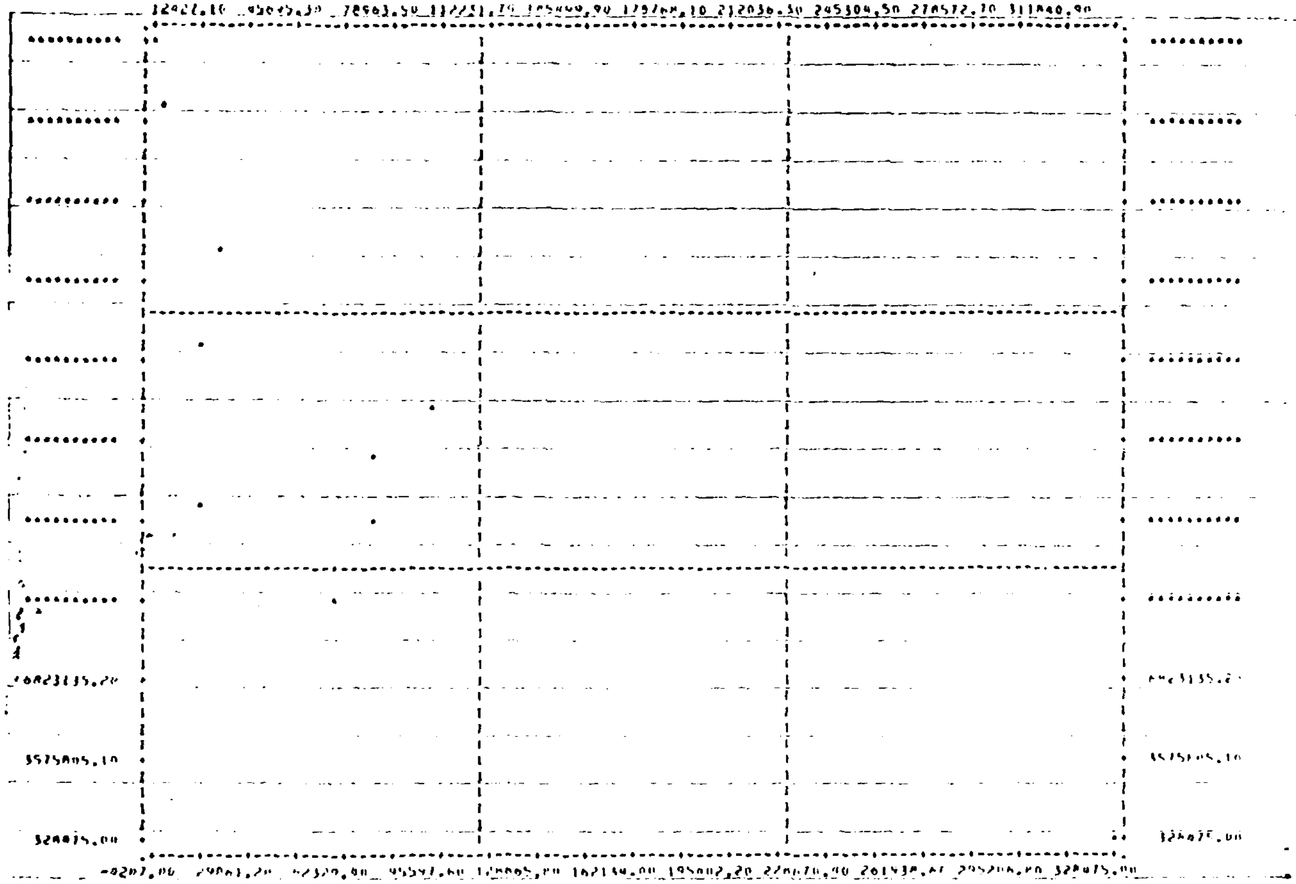
7. Debt / equity ratio - this is the measurement of a company's long term debt, including long term leases, relative to its equity (net worth). The ratio measures the degree to which a firm is leveraged to indicate the extent which it is financing operations and new investment through external sources.

EXHIBIT - 1

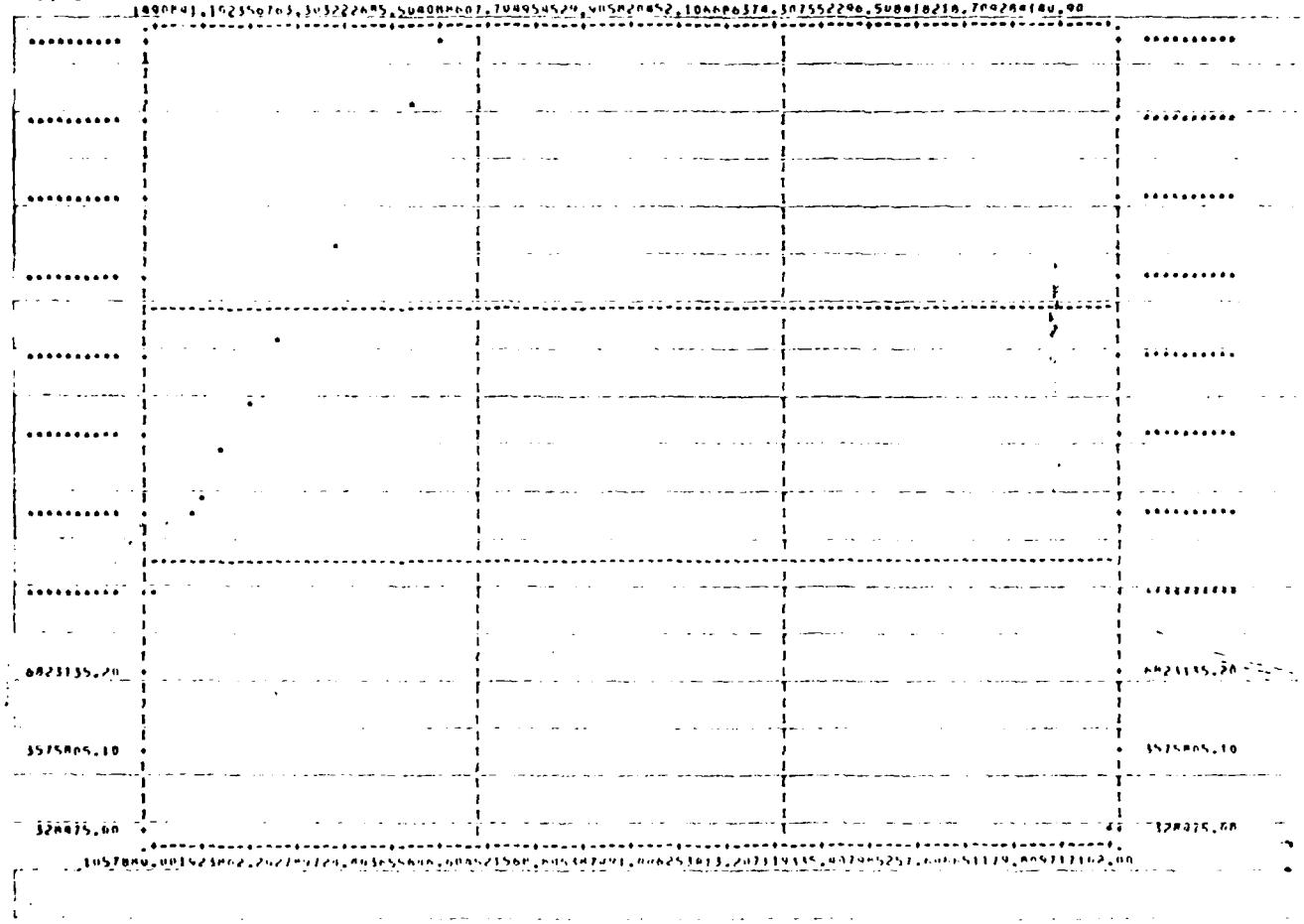
U.S. AIRLINE ANALYSIS VS TOTAL OPERATING REVENUE

AIRLINE FAILURES

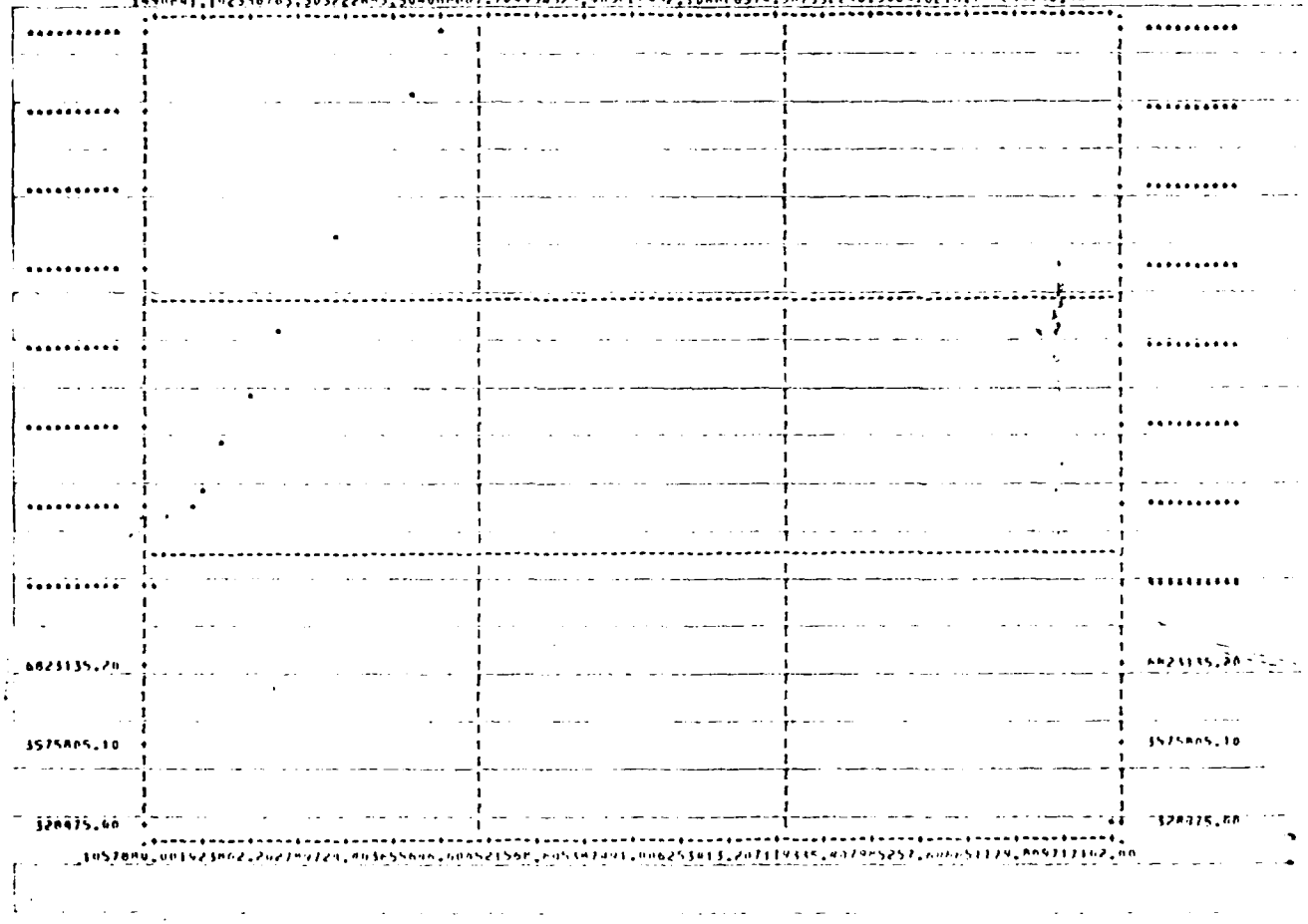
FILE NONAME (CREATION DATE = 12/20/82)
SCATTERGRAM OF (DOWN) DELTAPS (ACROSS) OPRPROFT OPERATING PROFIT



FILE NONAME (CREATION DATE = 12/20/82)
SCATTERGRAM OF (CROSS) OPERATING (ACROSS) TOTOPREX TOTAL OPERATING EXPENSE



FILE NUNAME (CREATION DATE = 12/20/82)
SCATTERGRAM OF (LOAN) DELTAFAIL (ACROSS) TOTOPHEX TOTAL OPERATING EXPENSE



AIRLINE FAILURES 12/20/82 PAGE 8

FILE NUNAME (CREATION DATE = 12/20/82)
SCATTERGRAM OF (DOWN) DEC76PRO (ACROSS) TONMILES FREIGHT TON MILES

3822060.1540916[illegible]4592b1198.754490693.0507700237.3549[illegible]10781.6555139325.9595350870[illegible]8555704[illegible]4.555297959A.05

6023135.20 6023135.20

3575805.10 3575805.10

328475.00 328475.00

3712208.90[illegible]

FILE NAME (CREATION DATE = 12/20/82)
SCATTERGRAM OF (LOCAL) DELTAPRO (ALMOSS) LOADFAIR REVENUE PAR LOAD FACTOR

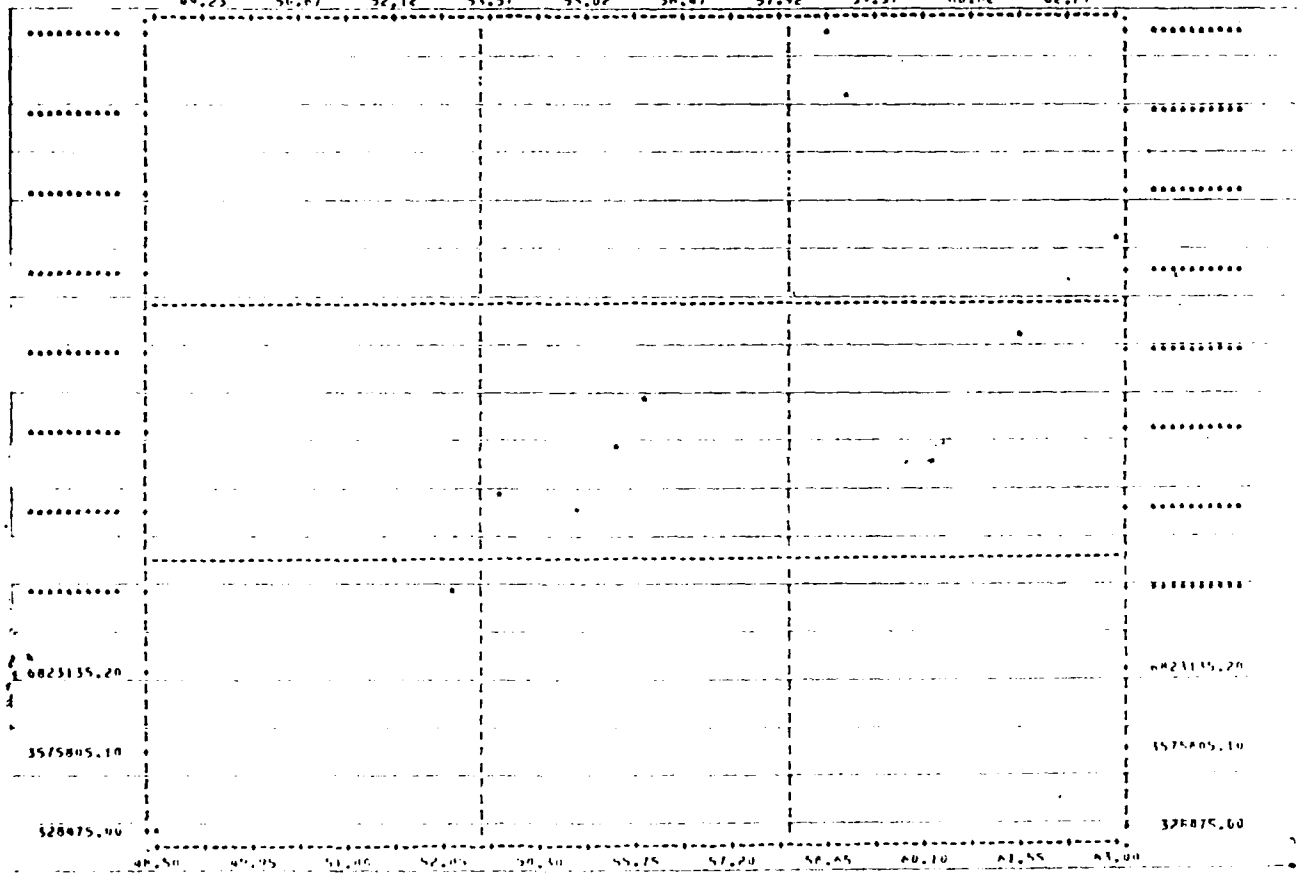


EXHIBIT - 2

U.S. ATELLITE ANALYSIS VS PROFIT

FILE NONAME (CREATION DATE = 12/20/82)

* * * * MULTIPLE REGRESSION * * * *

VARIABLE LIST NUMBER 2. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 2.

DEPENDENT VARIABLE.. TOTOPRNV TOT OPERATING REVENUE

BEGINNING BLOCK NUMBER 1. METHOD: STEPWISE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. TONMILES FREIGHT TON MILES

MULTIPLE R	0.82707	ANALYSIS OF VARIANCE			
R SQUARE	0.68405		DF	SUM OF SQUARES	MEAN SQUARE
ADJUSTED R SQUARE	0.64894	REGRESSION	1	0.55504D 15	0.55504D 15
STANDARD ERROR	0.53371D 07	RESIDUAL	4	0.25636D 15	0.28485D 14
		F = 19.48554	SIGNIF F = 0.0017		

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
TONMILES	10.79197	2.44681	0.82707	4.414	0.0017
(CONSTANT)	-0.38570D 08	0.12500 08		-2.766	0.0219

FOR BLOCK NUMBER 1 PCUT = 0.100 LIMITS REACHED.

FILE DONAME (CREATION DATE = 12/20/82)

*** * * * MULTIPLE REGRESSION * * * ***

VARIABLE LIST NUMBER 3. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 3.

DEPENDENT VARIABLE.. TOTOPREV TOT OPERATING REVENUE

BEGINNING BLOCK NUMBER 1. METHOD: STEPWISE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. PAXREV REVENUE PAX

MULTIPLE R	0.91069	ANALYSIS OF VARIANCE			
R SQUARE	0.82935		DF	SUM OF SQUARES	MEAN SQUARE
ADJUSTED R SQUARE	0.81039	REGRESSION	1	0.672940D 15	0.672940D 15
STANDARD ERROR	0.392230 07	RESIDUAL	9	0.138460D 15	0.153850 14
		F = 43.74070	SIGNIF F = 0.0001		

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
PAXREV	170.49890	25.77975	0.91069	6.614	0.0001
(CONSTANT)	-0.204020 08	0.62480 07		-3.272	0.0097

FOR BLOCK NUMBER 1 POUT = 0.100 LIMITS REACHED.

FILE NONAME (CREATION DATE = 12/20/82)

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 8. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 8.

DEPENDENT VARIABLE.. TOTOPRRV TOT OPERATING REVENUE

BEGINNING BLOCK NUMBER 1. METHOD: STEPWISE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. NOACFT NUMBER AIRCRAFT

		ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE
MULTIPLE R	0.79313				
R SQUARE	0.62906	REGRESSION	1	0.510420 15	0.510420 15
ADJUSTED R SQUARE	0.58785	RESIDUAL	9	0.300980 15	0.334420 14
STANDARD ERROR	0.578290 07				

F = 15.26273 SIGNIF F = 0.0036

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
NOACFT	35961.55482	9204.96801	0.79313	3.907	0.0036
(CONSTANT)	-0.663170 08	0.22200 08		-2.988	0.0153

FOR BLOCK NUMBER 1 POUT = 0.100 LIMITS REACHED.

AIRLINE FAILURES

FILE NONAME (CREATION DATE = 12/20/82)

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 9. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 9.

DEPENDENT VARIABLE.. TOTOPRV TOT OPERATING REVENUE

BEGINNING BLOCK NUMBER 1. METHOD: STEPWISE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. FUELCOST FUEL COST

MULTIPLE R	0.94604	ANALYSIS OF VARIANCE			
R SQUARE	0.89499		DF	SUM OF SQUARES	MEAN SQUARE
ADJUSTED R SQUARE	0.88332	REGRESSION	1	0.726190 15	0.726190 15
STANDARD ERROR	0.307690 07	RESIDUAL	9	0.852070 14	0.946750 13
		F = 76.70395		SIGNIF F = 0.0000	

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
FUELCOST	0.359120 08	0.41000 07	0.94604	8.758	0.0000
(CONSTANT)	0.681090 07	0.17820 07		3.823	0.0041

FOR BLOCK NUMBER 1 POUT = 0.100 LIMITS REACHED.

AIRLINE FAILURES

FILE NONAME (CREATION DATE = 12/20/82)

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 10. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 10.

DEPENDENT VARIABLE.. TOTOPRRV TOT OPERATING REVENUE

BEGINNING BLOCK NUMBER 1. METHOD: STEPWISE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. GNP GROSS NATIONAL PRODUCT

MULTIPLE R	0.99811	ANALYSIS OF VARIANCE			
R SQUARE	0.96032		DF	SUM OF SQUARES	MEAN SQUARE
ADJUSTED R SQUARE	0.97815	REGRESSION	1	0.795830 15	0.795830 15
STANDARD ERROR	0.13321D 07	RESIDUAL	9	0.159710 14	0.177460 13
		F = 448.25769		SIGNIF F = 0.0000	

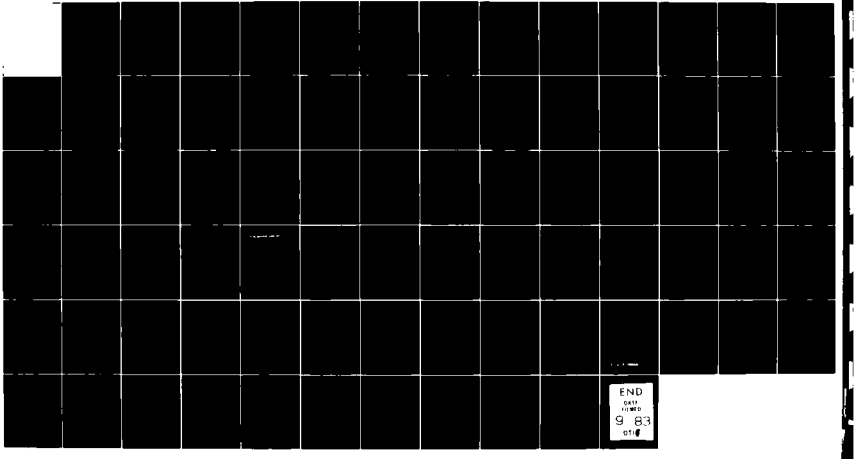
---------- VARIABLES IN THE EQUATION ----------

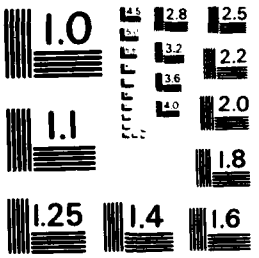
VARIABLE	B	SE B	BETA	T	SIG T
GNP	14788.40269	698.50104	0.99811	21.172	0.0000
(CONSTANT)	-0.686330 07	0.13570 07		-5.134	0.0006

FOR BLOCK NUMBER 1 POUT = 0.100 LIMITS REACHED.

AD-A131 009 THE EFFECT OF A MAJOR AIR CARRIER'S FAILURE ON THE CIVIL RESERVE AIR FLEET(U) NATIONAL WAR COLL WASHINGTON DC W DELAWTER APR 83 NDU/NWC-83-037 2/2

UNCLASSIFIED F/G 15/5 NL





FILE NONAME (CREATION DATE = 12/20/82)

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 12. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 12.

DEPENDENT VARIABLE.. TOTOPREV TOT OPERATING REVENUE

BEGINNING BLOCK NUMBER 1. METHOD: STEPWISE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. INTRATE INTEREST RATE

MULTIPLE R	0.84950	ANALYSIS OF VARIANCE			
R SQUARE	0.72131		DF	SUM OF SQUARES	MEAN SQUARE
ADJUSTED R SQUARE	0.69035	REGRESSION	1	0.585270 15	0.585270 15
STANDARD ERROR	0.501250 07	RESIDUAL	9	0.226130 15	0.251250 14
		F = 23.29447	SIGNIF F = 0.0009		

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
INTRATE	0.205270 07	0.42120 06	0.84950	4.826	0.0009
(CONSTANT)	0.305210 07	0.38520 07		0.787	0.4514

FOR BLOCK NUMBER 1 POUT = 0.100 LIMITS REACHED.

FILE NONAME (CREATION DATE = 12/20/82)

*** * * * MULTIPLE REGRESSION * * * ***

VARIABLE LIST NUMBER 13. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 13.

DEPENDENT VARIABLE.. TOTOPRRV TOT OPERATING REVENUE

BEGINNING BLOCK NUMBER 1. METHOD: STEPWISE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. FEDFUNDS FEDERAL SUBSIDY

MULTIPLE R	0.80318	ANALYSIS OF VARIANCE			
R SQUARE	0.64509		DF	SUM OF SQUARES	MEAN SQUARE
ADJUSTED R SQUARE	0.60566	REGRESSION	1	0.523430 15	0.523430 15
STANDARD ERROR	0.565660 07	RESIDUAL	9	0.287970 15	0.319970 14
		F = 16.35480		SIGNIF F = 0.0029	

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
FEDFUNDS	0.505440 07	0.1250D 07	0.80318	4.045	0.0029
(CONSTANT)	0.119980 08	0.2637D 07		4.550	0.0014

FOR BLOCK NUMBER 1 POUT = 0.100 LIMITS REACHED.

SPSS WITH GRAPHICS OPTION FOR [illegible] VERSION [illegible] RELEASE 9.0, OCTOBER 1, 1987

[illegible] FOR THE SPSS BATCH SYSTEM

ORDER FROM MCGRAW-HILL: SPSS, 2ND ED. (PRINCIPAL TEXT) ORDER FROM SPSS INC.: SPSS STATISTICAL ALGORITHMS
SPSS UPDATE 7-9 (USE W/SPSS, 2ND ED. FOR REL. 7, 8, 9) REFERENCE FOR SPSS INC. RESELLERS
SPSS POCKET GUIDE, RELEASE 4
SPSS PRIMER (HELPS BRIDGE TO SPSS)

DEFAULT SPACE ALLOCATION..
WORKSPACE 71680 BYTES
TRANSPACE 10240 BYTES

ALLOWS FOR.. 102 TRANSFORMATIONS
409 RECODE VALUES + LAG VARIABLES
1641 IF/COMPUTE OPERATIONS

```
     1 RUN NAME      AIRLINE FACTORS
     2 DATA LIST     FIXED(2)/1
     3               LOADFATH 3-8 TONMILES 9-14 PAXREV 15-19
     4               TOTOPHRV 21-28 TOTOPREX 30-36 OPRPROFT 38-45
     5               NETINCOM 46-51 RATEROI 52-54/2 NOACFT 1-4
     6               FUELCOST 6-8 GNP 10-13 UNEMPL 15-17
     7               INTRATE 19-23 FEDFUNDS 25-27

THE DATA LIST PROVIDES FOR  19 VARIABLES AND  2 RECORDS ('CARDS') PER CASE.  A MAXIMUM OF  54 COLUMNS ARE USED ON A RECO

WARNING - A NUMERIC VARIABLE HAS A WIDTH GREATER THAN 7.  SMALL ROUNDING/TRUNCATION ERRORS MAY RESULT.

LIST OF THE CONSTRUCTED FORMAT STATEMENT..
     (F2.0,1X,F7.0,1X,F9.0,1X,F8.0,1X,F7.0,1X,F6.0,1X,F3.2,F2.0,F3.0/F8.0,1X,F3.0,1X,F9.0,1X,F3.0,1X,F5.0,
     1X,F3.0)

     8 INPUT MEDIUM  DISK
     9 N OF CASES    UNKNOWN
    10 VAR LABELS    LOADFATH REVENUE PAX LOAD FACTOR/
    11               TONMILES FREIGHT TON MILES/
    12               PAXREV REVENUE PAX/
    13               TOTOPHRV TOT OPERATING REVENUE/
    14               TOTOPREX TOTAL OPERATING EXPENSE/
    15               OPRPROFT OPERATING PROFIT/
    16               NETINCOM NET INCOME/
    17               RATEROI RATE RETURN ON INV/
    18               NOACFT NUMBER AIRCRAFT/
    19               FUELCOST FUEL COST/
    20               GNP GROSS NATIONAL PRODUCT/
    21               UNEMPL UNEMPLOYMENT/
    22               INTRATE INTEREST RATE/
    23               FEDFUNDS FEDERAL SUMMARY/
    24 COMPUTE       DELTAPRO=TOTOPHRV-TOTOPREX
    25 REGRESSION    VARIABLES=LOADFATH TOTOPHRV/DEPENDENT=TOTOPHRV/
    26               STEPWISE/
    27               VARIABLES=TONMILES TOTOPHRV/DEPENDENT=TOTOPHRV/STEPWISE/
    28               VARIABLES=PAXREV TOTOPHRV/DEPENDENT=TOTOPHRV/STEPWISE/
    29               VARIABLES=TOTOPREX TOTOPHRV/DEPENDENT=TOTOPHRV/STEPWISE/
    30               VARIABLES=OPRPROFT TOTOPHRV/DEPENDENT=TOTOPHRV/STEPWISE/
    31               VARIABLES=NETINCOM TOTOPHRV/DEPENDENT=TOTOPHRV/STEPWISE/
```

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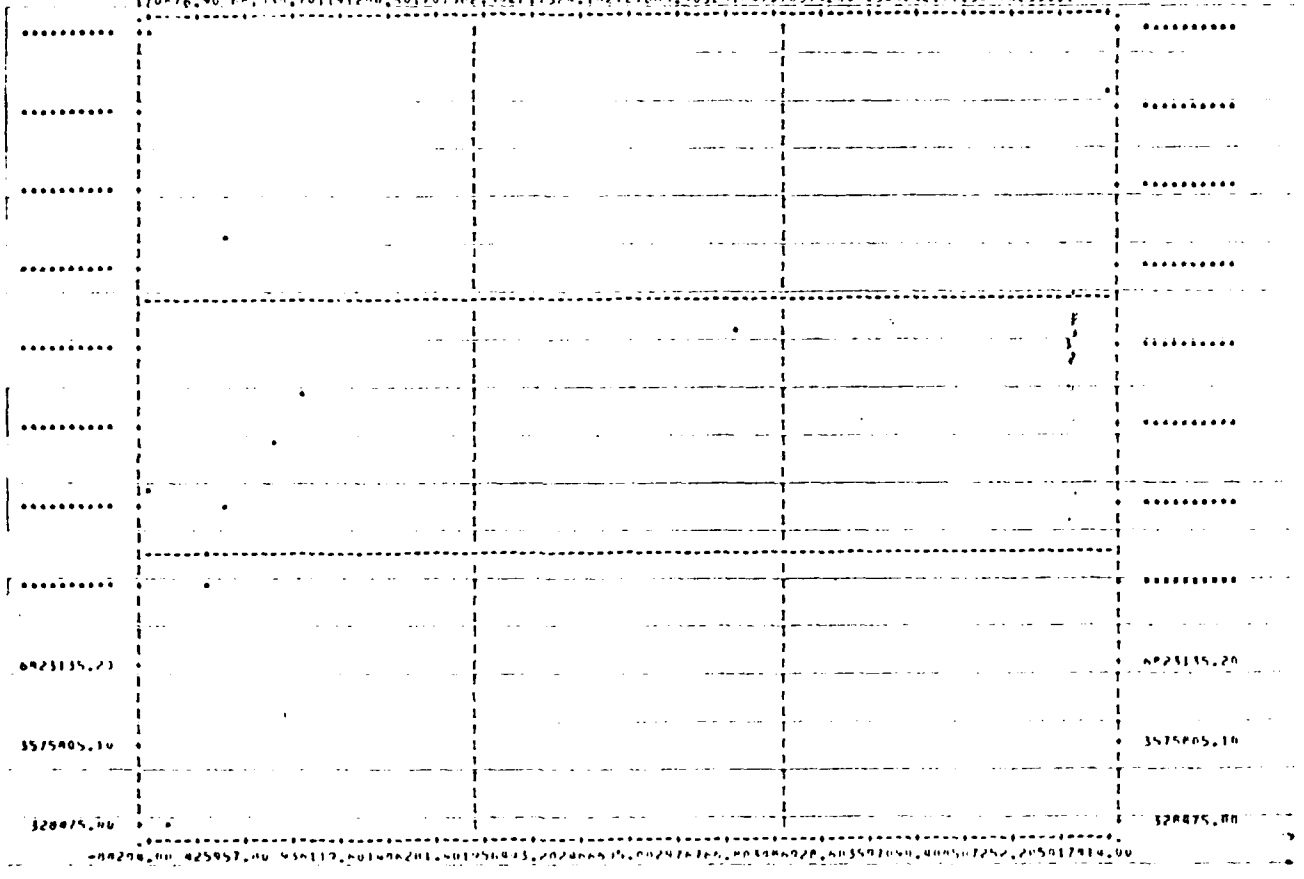
(INLINE FAILURES

                32 VARIABLES=RATEHOT TOTOPRRV/DEPENDENT=TOTOPRRV/STEPWISE/
                33 VARIABLES=MHACFT TOTOPRRV/DEPENDENT=TOTOPRRV/STEPWISE/
                34 VARIABLES=FUELCOST TOTOPRRV/DEPENDENT=TOTOPRRV/STEPWISE/
                35 VARIABLES=GNP TOTOPRRV/DEPENDENT=TOTOPRRV/STEPWISE/
                36 VARIABLES=UNEMPL TOTOPRRV/DEPENDENT=TOTOPRRV/STEPWISE/
                37 VARIABLES=INTRATE TOTOPRRV/DEPENDENT=TOTOPRRV/STEPWISE/
                38 VARIABLES=FEDFUNDS TOTOPRRV/DEPENDENT=TOTOPRRV/STEPWISE/

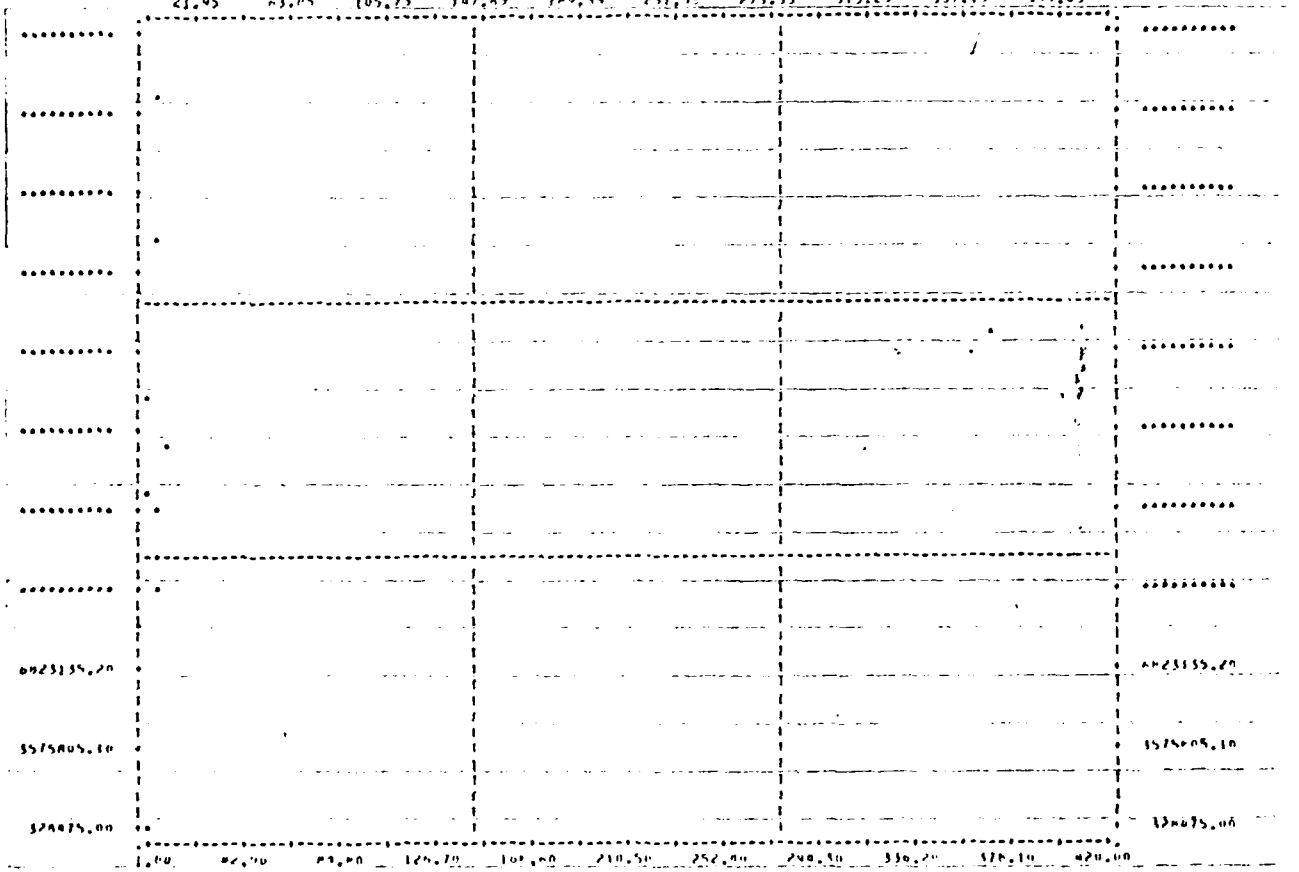
REGRESSION PROCEDURE REQUIRES    20100 BYTES OF WORKSPACE.

ENTER READING    11 CASES FROM SUBFILE NONAME .  END OF DATA WAS ENCOUNTERED ON LOGICAL UNIT # 6
```

FILE NONAME (CREATION DATE = 12/20/82)
SCATTERGRAM OF (DOWN) RELIANCE (ACROSS) METROCOP NET INCOME



FILE NONAME (CREATION DATE = 12/20/82)
SCATTERGRAM OF CHANGE IN STAND-BY RATE VS CHANGE IN RATE RETURN ON INV



S WITH GRAPHICS OPTION FOR VM/CMS, VERSION M, RELEASE 9.0, OCTOBER 1, 1981

CURRENT DOCUMENTATION FOR THE SPSS BATCH SYSTEM

ER FROM MCGRAW-HILL: SPSS, 2ND ED. (PRINCIPAL TEXT) ORDER FROM SPSS INC.: SPSS STATISTICAL ALG
SPSS UPDATE 7-9 (USE W/SPSS,2ND FOR REL. 7, 8, 9) KEYWORDS! THE SPSS I
SPSS POCKET GUIDE, RELEASE 9
SPSS PRIMER (BRIEF INTRO TO SPSS)

ULT SPACE ALLOCATION.. ALLOWS FOR.. 102 TRANSFORMATIONS
CSPACE 71680 BYTES 409 RECODE VALUES + LAG VARIABLES
ISPACE 10240 BYTES 1641 IF/COMPUTE OPERATIONS

1 RUN NAME AIRLINE FAILURES
2 DATA LIST FIXED(2)/1
3 LOADFATR 1-4 TONMILES 6-12 PAXREV 14-19
4 TOTOPRRV 21-28 TOTOPREX 30-36 OPRPROFT 38-43
5 NETINCOM 45-51 RATEROI 52-54/2 NOACFT 1-4
6 FUELCOST 6-8 GNP 10-13 UNEMPL 15-17
7 INTRATE 19-23 FEDFUNDS 25-27

DATA LIST PROVIDES FOR 14 VARIABLES AND 2 RECORDS ('CARDS') PER CASE. A MAXIMUM OF 54 COLUMNS ARE

ING - A NUMERIC VARIABLE HAS A WIDTH GREATER THAN 7, SMALL ROUNDING/TRUNCATION ERRORS MAY RESULT.

OF THE CONSTRUCTED FORMAT STATEMENT..
(F4.0,1X,F7.0,1X,F6.0,1X,F8.0,1X,F7.0,1X,F6.0,1X,F7.0,F3.0/F4.0,1X,F3.0,1X,F4.0,1X,F3.0,1X,F5.0,
1X,F3.0)

8 INPUT MEDIUM DISK
9 N OF CASES UNKNOWN
10 VAR LABELS LOADFATR REVENUE PAX LOAD FACTOR/
11 TONMILES FREIGHT TON MILES/
12 PAXREV REVENUE PAX/
13 TOTOPRRV TOT OPERATING REVENUE/
14 TOTOPREX TOTAL OPERATING EXPENSE/
15 OPPPROFT OPERATING PROFIT/
16 NETINCOM NET INCOME/
17 RATEROI RATE RETURN ON INV/
18 NOACFT NUMBER AIRCRAFT/
19 FUELCOST FUEL COST/
20 GNP GROSS NATIONAL PRODUCT/
21 UNEMPL UNEMPLOYMENT/
22 INTRATE INTEREST RATE/
23 FEDFUNDS FEDERAL SUBSIDY/
24 COMPUTE DELTAPRO=TOTOPRRV-TOTOPREX
25 SCATTERGRAM

EXHIBIT - 3

U.S. AIRLINE ANALYSIS, DESCRIPTIVE STATISTIC

FILE NOVAME (CREATION DATE = 12/20/82)

*** * * * MULTIPLE REGRESSION * * * ***

VARIABLE LIST NUMBER 8, LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 8.

DEPENDENT VARIABLE.. DELTAPRO

BEGINNING BLOCK NUMBER 1. METHOD: STEPWISE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. NOACFT NUMBER AIRCRAFT

MULTIPLE R	0.68735	ANALYSIS OF VARIANCE			F
R SQUARE	0.47245		DF	SUM OF SQUARES	MEAN SQUARE
ADJUSTED R SQUARE	0.41384	REGRESSION	1	0.416400 15	0.416400 15
STANDARD ERROR	0.718760 07	RESIDUAL	9	0.464960 15	0.516620 14
		F = 8.06008	SIGNIF F = 0.0194		

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
NOACFT	32481.02122	11440.89427	0.68735	2.839	0.0194
(CONSTANT)	-0.607140 08	0.27590 08		-2.201	0.0553

FOR BLOCK NUMBER 1 POUT = 0.100 LIMITS REACHED.

A RLINE FAILURES

FILE NONAME (CREATION DATE = 12/20/82)

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 9. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 9.

DEPENDENT VARIABLE.. DELTAPRO

BEGINNING BLOCK NUMBER 1. METHOD: STEPWISE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. FUELCOST FUEL COST

		ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE
MULTIPLE R	0.88046				
R SQUARE	0.77521	REGRESSION	1	0.683240 15	0.683240 15
ADJUSTED R SQUARE	0.75023	RESIDUAL	9	0.198120 15	0.220130 14
STANDARD ERROR	0.469180 07				

F = 31.03735 SIGNIF F = 0.0003

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
FUELCOST	0.348330 08	0.62530 07	0.88046	5.571	0.0003
(CONSTANT)	0.444730 07	0.27170 07		1.637	0.1360

FOR BLOCK NUMBER 1 POUT = 0.100 LIMITS REACHED.

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 10. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 10.

DEPENDENT VARIABLE.. DELTAPRO

BEGINNING BLOCK NUMBER 1. METHOD: STEPWISE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. GNP GROSS NATIONAL PRODUCT

MULTIPLE R	0.97035	ANALYSIS OF VARIANCE			
R SQUARE	0.94158		DF	SUM OF SQUARES	MEAN SQUARE
ADJUSTED R SQUARE	0.93509	REGRESSION	1	0.829870 15	0.829870 15
STANDARD ERROR	0.239180 07	RESIDUAL	9	0.514860 14	0.572070 13

F = 145.06393 SIGNIF F = 0.0000

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
GNP	15105.17236	1254.13985	0.97035	12.044	0.0000
(CONSTANT)	-0.102050 08	0.24000 07		-4.252	0.0021

FOR BLOCK NUMBER 1 POUT = 0.100 LIMITS REACHED.

FILE NONAME (CREATION DATE = 12/20/82)

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 5. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 5.

DEPENDENT VARIABLE.. DELTAPRO

BEGINNING BLOCK NUMBER 1. METHOD: STEPWISE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. OPRPROFT OPERATING PROFIT

MULTIPLE R	0.76267	ANALYSIS OF VARIANCE			
R SQUARE	0.58167		DF	SUM OF SQUARES	MEAN SQUARE
ADJUSTED R SQUARE	0.53519	REGRESSION	1	0.512660D 15	0.512660D 15
STANDARD ERROR	0.640050D 07	RESIDUAL	9	0.368700D 15	0.409667D 14
		F = 12.51401		SIGNIF F = 0.0063	

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
OPRPROFT	-76.77211	21.70227	-0.76267	-3.538	0.0063
(CONSTANT)	0.223990D 08	0.2397D 07		9.343	0.0000

FOR BLOCK NUMBER 1 PIN = 0.100 LIMITS REACHED.

ILE NONAME (CREATION DATE = 12/20/82)

**** MULTIPLE REGRESSION ****

ARIABLE LIST NUMBER 3. LISTWISE DELETION OF MISSING DATA.

QUATION NUMBER 3.

EPENDENT VARIABLE.. DELTAPRO

EGINNING BLOCK NUMBER 1. METHOD: STEPWISE

ARIABLE(S) ENTERED ON STEP NUMBER 1.. PAXREV REVENUE PAX

						F
ULTIPLE R	0.90932	ANALYSIS OF VARIANCE				
SQUARE	0.82687		DF	SUM OF SQUARES	MEAN SQUARE	
DJUSTED R SQUARE	0.80763	REGRESSION	1	0.72876D 15	0.72876D 15	
TANDARD ERROR	0.41176D 07	RESIDUAL	9	0.15259D 15	0.16955D 14	

F = 42.98307 SIGNIF F = 0.0001

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
PAXREV	177.43029	27.06319	0.90932	6.556	0.0001
(CONSTANT)	-0.24855D 08	0.65590 07		-3.790	0.0043

OR BLOCK NUMBER 1 POUT = 0.100 LIMITS REACHED.

AIRLINE FAILURES

FILE NONAME (CREATION DATE = 12/20/82)

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 12. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 12.

DEPENDENT VARIABLE.. DELTAPRO

BEGINNING BLOCK NUMBER 1. METHOD: STEPWISE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. INTRATE INTEREST RATE

		ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE
MULTIPLE R	0.82289				
R SQUARE	0.67715	REGRESSION	1	0.596810 15	0.596810 15
ADJUSTED R SQUARE	0.64128	RESIDUAL	9	0.28455D 15	0.31616D 14
STANDARD ERROR	0.56226D 07				

F = 18.87656 SIGNIF F = 0.0019

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
INTRATE	0.20526D 07	0.47240 06	0.82289	4.345	0.0019
(CONSTANT)	100924.18021	0.43210 07		0.023	0.9819

FOR BLOCK NUMBER 1 POUT = 0.100 LIMITS REACHED.

ILE NONAME (CREATION DATE = 12/20/82)

*** * * * MULTIPLE REGRESSION * * * ***

ARIABLE LIST NUMBER 13. LISTWISE DELETION OF MISSING DATA.

QUATION NUMBER 13.

EPENDENT VARIABLE.. DELTAPRO

EGINNING BLOCK NUMBER 1. METHOD: STEPWISE

ARIABLE(S) ENTERED ON STEP NUMBER 1.. FEDFUNDS FEDERAL SUBSIDY

ULTIPLE R	0.78133	ANALYSIS OF VARIANCE			
SQUARE	0.61047		DF	SUM OF SQUARES	MEAN SQUARE
DJUSTED R SQUARE	0.56714	REGRESSION	1	0.53804D 15	0.53804D 15
TANDARD ERROR	0.61762D 07	RESIDUAL	9	0.34331D 15	0.38146D 14

F = 14.10496 SIGNIF F = 0.0045

---------- VARIABLES IN THE EQUATION ----------

ARIABLE	B	SE B	BETA	T	SIG T
EDFUNDS	0.51245D 07	0.13640D 07	0.78133	3.756	0.0045
CONSTANT)	0.91217D 07	0.28790D 07		3.168	0.0114

OR BLOCK NUMBER 1 POUT = 0.100 LIMITS REACHED.

EXHIBIT - 4

U. S. AIRLINE ANALYSIS, SCATTERGRAM

AIRLINE FAILURES

FILE NONAME (CREATION DATE = 12/20/82)

DELTAPRO

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	328475.	1	9.1	9.1	9.1
	10105591.	1	9.1	9.1	18.2
	11235926.	1	9.1	9.1	27.3
	13301787.	1	9.1	9.1	36.4
	13833117.	1	9.1	9.1	45.5
	15823272.	1	9.1	9.1	54.5
	18023120.	1	9.1	9.1	63.6
	20732032.	1	9.1	9.1	72.7
	24523888.	1	9.1	9.1	81.8
	30332848.	1	9.1	9.1	90.9
	32801776.	1	9.1	9.1	100.0
	TOTAL	11	100.0	100.0	

MEAN	**********	STD ERR 2830603.000	MEDIAN **********
MODE	328475.000	STD DEV 9388049.000	VARIANCE **********
KURTOSIS	0.003	SKEWNESS 0.097	RANGE **********
MINIMUM	328475.000	MAXIMUM **********	

VALID CASES 11 MISSING CASES 0

AIHL

FILE NONAME (CREATION DATE = 12/20/82)

FEDFUNDS FEDERAL SUBSIDY

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	0.	3	27.3	27.3	27.3
	1.	2	18.2	18.2	45.5
	1.	1	9.1	9.1	54.5
	2.	1	9.1	9.1	63.6
	2.	1	9.1	9.1	72.7
	3.	1	9.1	9.1	81.8
	3.	1	9.1	9.1	90.9
	4.	1	9.1	9.1	100.0
	TOTAL	11	100.0	100.0	

MEAN	1.609	STD ERR	0.452	MEDIAN	0.800
MODE	0.200	STD DEV	1.431	VARIANCE	2.049
KURTOSIS	-1.306	SKEWNESS	0.451	RANGE	3.600
MINIMUM	0.200	MAXIMUM	3.800		
VALID CASES	11	MISSING CASES	0		

FILE NONAME (CREATION DATE = 12/20/82)

INTRATE INTEREST RATE

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	5.	2	18.2	18.2	18.2
	5.	1	9.1	9.1	27.3
	6.	1	9.1	9.1	36.4
	6.	1	9.1	9.1	45.5
	8.	1	9.1	9.1	54.5
	8.	1	9.1	9.1	63.6
	10.	1	9.1	9.1	72.7
	11.	1	9.1	9.1	81.8
	13.	1	9.1	9.1	90.9
	16.	1	9.1	9.1	100.0
	TOTAL	11	100.0	100.0	

MEAN	8.412	STD ERR	1.135	MEDIAN	7.940
MODE	4.660	STD DEV	3.764	VARIANCE	14.165
KURTOSIS	0.341	SKEWNESS	0.978	RANGE	11.690
MINIMUM	4.660	MAXIMUM	16.350		

VALID CASES 11 MISSING CASES 0

FILE NONAME (CREATION DATE = 12/20/82)

UNEMPL UNEMPLOYMENT

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	5.	3	27.3	27.3	27.3
	6.	1	9.1	9.1	36.4
	6.	1	9.1	9.1	45.5
	6.	1	9.1	9.1	54.5
	7.	1	9.1	9.1	63.6
	7.	1	9.1	9.1	72.7
	8.	1	9.1	9.1	81.8
	8.	1	9.1	9.1	90.9
	9.	1	9.1	9.1	100.0
	TOTAL	11	100.0	100.0	

MEAN	6.427	STD ERR	0.410	MEDIAN	6.000
MODE	4.900	STD DEV	1.359	VARIANCE	1.846
KURTOSIS	-1.441	SKEWNESS	0.314	RANGE	3.600
MINIMUM	4.900	MAXIMUM	8.500		
VALID CASES	11	MISSING CASES	0		

AIRLINE FAILURES

FILE NONAME (CREATION DATE = 12/20/82)

GNP GROSS NATIONAL PRODUCT

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	1063.	1	9.1	9.1	9.1
	1171.	1	9.1	9.1	18.2
	1307.	1	9.1	9.1	27.3
	1413.	1	9.1	9.1	36.4
	1529.	1	9.1	9.1	45.5
	1702.	1	9.1	9.1	54.5
	1900.	1	9.1	9.1	63.6
	2128.	1	9.1	9.1	72.7
	2414.	1	9.1	9.1	81.8
	2626.	1	9.1	9.1	90.9
	2826.	1	9.1	9.1	100.0
	TOTAL	11	100.0	100.0	

MEAN	1825.364	STD ERR	181.637	MEDIAN	1702.000
MODE	1063.000	STD DEV	603.085	VARIANCE	363712.250
KURTOSIS	-1.156	SKEWNESS	0.438	RANGE	1763.000
MINIMUM	1063.000	MAXIMUM	2826.000		

VALID CASES 11 MISSING CASES 0

:LE NONAME (CREATION DATE = 12/20/82)

JELCOST FUEL COST

ATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	0.	4	36.4	36.4	36.4
	0.	1	9.1	9.1	45.5
	0.	1	9.1	9.1	54.5
	0.	1	9.1	9.1	63.6
	0.	1	9.1	9.1	72.7
	0.	1	9.1	9.1	81.8
	1.	1	9.1	9.1	90.9
	1.	1	9.1	9.1	100.0
	TOTAL	11	100.0	100.0	

EAN	0.371	STD ERR	0.072	MEDIAN	0.300
ODE	0.200	STD DEV	0.237	VARIANCE	0.056
URTOSIS	1.770	SKEWNESS	1.650	RANGE	0.700
INIMUM	0.200	MAXIMUM	0.900		

ALID CASES 11 MISSING CASES 0

FILE NOOAME (CREATION DATE = 12/20/82)

NOACFT NUMBER AIRCRAFT

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	2229.	1	9.1	9.1	9.1
	2244.	1	9.1	9.1	18.2
	2264.	1	9.1	9.1	27.3
	2266.	1	9.1	9.1	36.4
	2267.	1	9.1	9.1	45.5
	2361.	2	18.2	18.2	63.6
	2389.	1	9.1	9.1	72.7
	2542.	1	9.1	9.1	81.8
	2712.	1	9.1	9.1	90.9
	2808.	1	9.1	9.1	100.0
	TOTAL	11	100.0	100.0	

MEAN	2403.909	STD ERR	59.900	MEDIAN	2360.750
MODE	2361.000	STD DEV	198.667	VARIANCE	39468.461
KURTOSIS	0.391	SKEWNESS	1.252	RANGE	579.000
MINIMUM	2229.000	MAXIMUM	2808.000		

VALID CASES 11 MISSING CASES 0

FILE NONAME (CREATION DATE = 12/20/82)

NOACFT NUMBER AIRCRAFT

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	2229.	1	9.1	9.1	9.1
	2244.	1	9.1	9.1	18.2
	2264.	1	9.1	9.1	27.3
	2266.	1	9.1	9.1	36.4
	2267.	1	9.1	9.1	45.5
	2361.	2	18.2	18.2	63.6
	2389.	1	9.1	9.1	72.7
	2542.	1	9.1	9.1	81.8
	2712.	1	9.1	9.1	90.9
	2808.	1	9.1	9.1	100.0
	TOTAL	11	100.0	100.0	

MEAN	2403.909	STD ERR	59.900	MEDIAN	2360.750
MODE	2361.000	STD DEV	198.667	VARIANCE	39468.461
KURTOSIS	0.391	SKEWNESS	1.252	RANGE	579.000
MINIMUM	2229.000	MAXIMUM	2808.000		

VALID CASES 11 MISSING CASES 0

FILE NONAME (CREATION DATE = 12/20/82)

RATEHOI RATE RETURN ON INV

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	1.	1	9.1	9.1	9.1
	2.	1	9.1	9.1	18.2
	3.	1	9.1	9.1	27.3
	4.	1	9.1	9.1	36.4
	5.	2	18.2	18.2	54.5
	6.	1	9.1	9.1	63.6
	7.	1	9.1	9.1	72.7
	8.	1	9.1	9.1	81.8
	370.	1	9.1	9.1	90.9
	420.	1	9.1	9.1	100.0
	TOTAL	11	100.0	100.0	

MEAN	75.545	STD ERR	47.745	MEDIAN	5.250
MODE	5.000	STD DEV	158.351	VARIANCE	25075.031
KURTOSIS	2.197	SKEWNESS	1.944	RANGE	419.000
MINIMUM	1.000	MAXIMUM	420.000		
VALID CASES	11	MISSING CASES	0		

INLINE FAILURES

ILE [illegible] (CREATION DATE = [illegible])

IETINCOM NET INCOME

ATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	218850.	1	9.1	9.1	9.1
	521641.	1	9.1	9.1	18.2
	306805.	1	9.1	9.1	27.3
	752536.	1	9.1	9.1	36.4
	3011965.	1	9.1	9.1	45.5
	0.	1	9.1	9.1	54.5
	-88204.	1	9.1	9.1	63.6
	28906.	1	9.1	9.1	72.7
	226693.	1	9.1	9.1	81.8
	563554.	1	9.1	9.1	90.9
	5017414.	1	9.1	9.1	100.0
	TOTAL	11	100.0	100.0	

EAN	945372.688	STD ERR	470192.563	MEDIAN	0.0
ODE	218850.000	STD DEV	1572719.000	VARIANCE	**********
URTOSIS	9.700	SKEWNESS	2.500	RANGE	5103618.000
INIMUM	-88204.000	MAXIMUM	5017414.000		

ALID CASES 11 MISSING CASES 0

AIRLINE FAILURES 12/20/82 PAGE 1

FILE NONAME (CREATION DATE = 12/20/82)

OPRPROFT OPERATING PROFIT

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	-4207.	1	9.1	9.1	9.1
	-2216.	1	9.1	9.1	18.2
	12787.	1	9.1	9.1	27.3
	13644.	1	9.1	9.1	36.4
	14985.	1	9.1	9.1	45.5
	58447.	1	9.1	9.1	54.5
	58526.	1	9.1	9.1	63.6
	72193.	1	9.1	9.1	72.7
	72574.	1	9.1	9.1	81.8
	90804.	1	9.1	9.1	90.9
	328475.	1	9.1	9.1	100.0
	TOTAL	11	100.0	100.0	

MEAN	65539.625	STD ERR	28119.852	MEDIAN	58447.000
MODE	-4207.000	STD DEV	93263.000	VARIANCE	**********
KURTOSIS	7.572	SKEWNESS	2.586	RANGE	332682.000
MINIMUM	-4207.000	MAXIMUM	328475.000		

VALID CASES 11 MISSING CASES 0

FILE NONAME (CREATION DATE = 12/20/82)

TOTOPREX TOTAL OPERATING EXPENSE

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	1057880.	1	9.1	9.1	9.1
	1183351.	1	9.1	9.1	18.2
	1397338.	1	9.1	9.1	27.3
	1522894.	1	9.1	9.1	36.4
	1677428.	1	9.1	9.1	45.5
	1901676.	1	9.1	9.1	54.5
	2151909.	1	9.1	9.1	63.6
	2702761.	1	9.1	9.1	72.7
	3394942.	1	9.1	9.1	81.8
	3691391.	1	9.1	9.1	90.9
	9717102.	1	9.1	9.1	100.0
	TOTAL	11	100.0	100.0	

MEAN	2765549.000	STD ERR	782984.813	MEDIAN	1901676.000
MODE	1057880.000	STD DEV	2868202.000	VARIANCE	**********
KURTOSIS	1.575	SKEWNESS	2.028	RANGE	8659222.000
MINIMUM	1057880.000	MAXIMUM	9717102.000		

VALID CASES 11 MISSING CASES 0

FILE NONAME (CREATION DATE = 12/20/82)

PAXREV REVENUE PAX

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	173669.	1	9.1	9.1	9.1
	191349.	1	9.1	9.1	18.2
	202206.	1	9.1	9.1	27.3
	205062.	1	9.1	9.1	36.4
	207459.	1	9.1	9.1	45.5
	223318.	1	9.1	9.1	54.5
	240326.	1	9.1	9.1	63.6
	274719.	1	9.1	9.1	72.7
	285720.	1	9.1	9.1	81.8
	296903.	1	9.1	9.1	90.9
	316863.	1	9.1	9.1	100.0
	TOTAL	11	100.0	100.0	

AN	237963.125	STD ERR	14506.719	MEDIAN	223318.000
DE	173669.000	STD DEV	48113.348	VARIANCE	**********
RTOSIS	-1.514	SKEWNESS	0.411	RANGE	143194.000
NIMUM	173669.000	MAXIMUM	316863.000		

VID CASES 11 MISSING CASES 0

IRLINE FAILURES

ILE NONAME (CREATION DATE = 12/20/82)

JTOPRRV TOT OPERATING REVENUE

ATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	10045577.	1	9.1	9.1	9.1
	11163271.	1	9.1	9.1	18.2
	12418777.	1	9.1	9.1	27.3
	14699125.	1	9.1	9.1	36.4
	15355921.	1	9.1	9.1	45.5
	17501200.	1	9.1	9.1	54.5
	19924800.	1	9.1	9.1	63.6
	22883952.	1	9.1	9.1	72.7
	27226650.	1	9.1	9.1	81.8
	33727792.	1	9.1	9.1	90.9
	36493168.	1	9.1	9.1	100.0
	TOTAL	11	100.0	100.0	

EAN **********	STD ERR 2715943.000	MEDIAN **********	
ODE **********	STD DEV 9007766.000	VARIANCE **********	
URTOSIS -0.540	SKEWNESS 0.799	RANGE **********	
INIMUM **********	MAXIMUM **********		
ALID CASES 11	MISSING CASES 0		

FILE NONAME (CREATION DATE = 12/20/82)

LOADFATR REVENUE PAX LOAD FACTOR

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	49.	1	9.1	9.1	9.1
	52.	1	9.1	9.1	18.2
	53.	1	9.1	9.1	27.3
	54.	1	9.1	9.1	36.4
	55.	1	9.1	9.1	45.5
	55.	1	9.1	9.1	54.5
	56.	1	9.1	9.1	63.6
	59.	1	9.1	9.1	72.7
	59.	1	9.1	9.1	81.8
	62.	1	9.1	9.1	90.9
	65.	1	9.1	9.1	100.0
	TOTAL	11	100.0	100.0	

MEAN	55.964	STD ERR	1.287	MEDIAN	55.400
MODE	48.500	STD DEV	4.270	VARIANCE	18.233
KURTOSIS	-0.331	SKEWNESS	0.082	RANGE	14.500
MINIMUM	48.500	MAXIMUM	63.000		

VALID CASES 11 MISSING CASES 0

FILE NONAME (CREATION DATE = 12/20/82)

LOADFATR REVENUE PAX LOAD FACTOR

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	49.	1	9.1	9.1	9.1
	52.	1	9.1	9.1	18.2
	53.	1	9.1	9.1	27.3
	54.	1	9.1	9.1	36.4
	55.	1	9.1	9.1	45.5
	55.	1	9.1	9.1	54.5
	56.	1	9.1	9.1	63.6
	59.	1	9.1	9.1	72.7
	59.	1	9.1	9.1	81.8
	62.	1	9.1	9.1	90.9
	63.	1	9.1	9.1	100.0
	TOTAL	11	100.0	100.0	

MEAN	55.964	STD ERR	1.287	MEDIAN	55.400
MODE	48.500	STD DEV	8.270	VARIANCE	68.233
KURTOSIS	-0.331	SKEWNESS	0.082	RANGE	14.500
MINIMUM	48.500	MAXIMUM	63.000		

VALID CASES 11 MISSING CASES 0

FILE NONAME (CREATION DATE = 12/20/82)

TONMILES FREIGHT TON MILES

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	3712288.	1	9.1	9.1	9.1
	4217452.	1	9.1	9.1	18.2
	4736729.	1	9.1	9.1	27.3
	4766118.	1	9.1	9.1	36.4
	4890026.	1	9.1	9.1	45.5
	5074193.	1	9.1	9.1	54.5
	5385129.	1	9.1	9.1	63.6
	5616750.	1	9.1	9.1	72.7
	5665622.	1	9.1	9.1	81.8
	5763249.	1	9.1	9.1	90.9
	5907731.	1	9.1	9.1	100.0
	TOTAL	11	100.0	100.0	

MEAN	5068657.000	STD ERR	208144.000	MEDIAN	5074193.000
MODE	3712288.000	STD DEV	690535.750	VARIANCE	**********
KURTOSIS	-0.207	SKEWNESS	-0.678	RANGE	2195443.000
MINIMUM	3712288.000	MAXIMUM	5907731.000		
VALID CASES	11	MISSING CASES	0		

FILE NONAME (CREATION DATE = 12/20/82)

LOADFATR REVENUE PAX LOAD FACTOR

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	49.	1	9.1	9.1	9.1
	52.	1	9.1	9.1	18.2
	53.	1	9.1	9.1	27.3
	54.	1	9.1	9.1	36.4
	55.	1	9.1	9.1	45.5
	55.	1	9.1	9.1	54.5
	56.	1	9.1	9.1	63.6
	59.	1	9.1	9.1	72.7
	59.	1	9.1	9.1	81.8
	62.	1	9.1	9.1	90.9
	63.	1	9.1	9.1	100.0
	TOTAL	11	100.0	100.0	

MEAN	55.964	STD ERR	1.287	MEDIAN	55.400
MODE	48.500	STD DEV	8.270	VARIANCE	18.233
KURTOSIS	-0.331	SKEWNESS	0.082	RANGE	14.500
MINIMUM	48.500	MAXIMUM	63.000		

VALID CASES 11 MISSING CASES 0

FILE NONAME (CREATION DATE = 12/20/82)

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 1. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 1.

DEPENDENT VARIABLE.. DELTAPRO

BEGINNING BLOCK NUMBER 1. METHOD: STEPWISE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. LOADFATR REVENUE PAX LOAD FACTOR

MULTIPLE R	0.83465	ANALYSIS OF VARIANCE			
R SQUARE	0.69663		DF	SUM OF SQUARES	MEAN SQUARE
ADJUSTED R SQUARE	0.66293	REGRESSION	1	0.613960 15	0.613960 15
STANDARD ERROR	0.545050 07	RESIDUAL	9	0.26737D 15	0.297080 14

F = 20.66702 SIGNIF F = 0.0014

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
LOADFATR	0.183510 07	0.40370 06	0.83465	4.546	0.0014
(CONSTANT)	-0.853300 08	0.22650 08		-3.767	0.0044

FOR BLOCK NUMBER 1 POUT = 0.100 LIMITS REACHED.

FILE NONAME (CREATION DATE = 12/20/82)

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 2. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 2.

DEPENDENT VARIABLE.. DELTAPRO

BEGINNING BLOCK NUMBER 1. METHOD: STEPWISE

VARIABLE(S) ENTERED ON STEP NUMBER 1.. TONMILES FREIGHT TON MILES

MULTIPLE R	0.89683	ANALYSIS OF VARIANCE			
R SQUARE	0.80431		DF	SUM OF SQUARES	MEAN SQUARE
ADJUSTED R SQUARE	0.78256	REGRESSION	1	0.708880 15	0.708880 15
STANDARD ERROR	0.437770 07	RESIDUAL	9	0.172470 15	0.191640 14
		F = 36.99057		SIGNIF F = 0.0002	

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
TONMILES	12.19625	2.00531	0.89683	6.082	0.0002
(CONSTANT)	-0.644510 06	0.102500 06		-6.337	0.0019

FOR BLOCK NUMBER 1. POUT = 0.100 LIMITS REACHED.

```
TRANSPACE REQUIRED..      100 BYTES
     1 TRANSFORMATIONS
     0 RECODE VALUES + LAG VARIABLES
     5 IF/COMPUTE OPERATIONS

PU TIME REQUIRED..    0.24 SECONDS


                39 NEW REGRESSION  VARIABLES=LOADFATR DELTAPRO/DEPENDENT=DELTAPRO/
                40                 STEPWISE/
                41                 VARIABLES=TOURFLES DELTAPRO/DEPENDENT=DELTAPRO/STEPWISE/
                42                 VARIABLES=PAXREV DELTAPRO/DEPENDENT=DELTAPRO/STEPWISE/
                43                 VARIABLES=TOTOPREV DELTAPRO/DEPENDENT=DELTAPRO/STEPWISE/
                44                 VARIABLES=OPRPROFT DELTAPRO/DEPENDENT=DELTAPRO/STEPWISE/
                45                 VARIABLES=NETINCOM DELTAPRO/DEPENDENT=DELTAPRO/STEPWISE/
                46                 VARIABLES=RATEROI DELTAPRO/DEPENDENT=DELTAPRO/STEPWISE/
                47                 VARIABLES=ROACFT DELTAPRO/DEPENDENT=DELTAPRO/STEPWISE/
                48                 VARIABLES=FUELCOST DELTAPRO/DEPENDENT=DELTAPRO/STEPWISE/
                49                 VARIABLES=GNP DELTAPRO/DEPENDENT=DELTAPRO/STEPWISE/
                50                 VARIABLES=UNEMPL DELTAPRO/DEPENDENT=DELTAPRO/STEPWISE/
                51                 VARIABLES=INTRATE DELTAPRO/DEPENDENT=DELTAPRO/STEPWISE/
                52                 VARIABLES=FEDFUNDS DELTAPRO/DEPENDENT=DELTAPRO/STEPWISE/

GRESSION PROCEDURE REQUIRES    20104 BYTES OF WORKSPACE.
```

EXHIBIT - 5

SELECTED AIRLINES

SUMMARY OF FACTORS AFFECTING OPERATING COST

	PASSENGER REVENUE	FREIGHT TONS	FUEL COST	GNP
PAN AM	.00062	.00913	*.1513	.0248
WORLD	.2053	.05021	*.42604	.2504
UNITED	.48497	.34106	.42982	*.56155
TEXAS AIR CORP.	.02070	.05514	*.21094	.02222
FLYING TIGERS	.8245	.7668	*.9577	.9221

* Most significant contribution to airline operating cost.

NOTE: 1. Numbers represent the correlation between each variable and operating cost.

2. See Appendix I for detailed analysis.

MULTIPLE REGRESSION RUN 01/14/83

FILE SOLVENCY (CREATION DATE = 01/14/83) DATA FOR PREDICTING AIRLINE FAILURES

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 11. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 11.

DEPENDENT VARIABLE.. UNITED

BEGINNING BLOCK NUMBER 1. METHOD: ENTER

VARIABLE(S) ENTERED ON STEP NUMBER 1.. FUELCOST

MULTIPLE R	0.65560	ANALYSIS OF VARIANCE			
R SQUARE	0.42982		DF	SUM OF SQUARES	MEAN SQUARE
ADJUSTED R SQUARE	0.35855	REGRESSION	1	102.85537	102.85537
STANDARD ERROR	4.12984	RESIDUAL	8	136.44456	17.05557

F = 6.03060 SIGNIF F = 0.0396

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
FUELCOST	-13.91818	5.66764	-0.65560	-2.456	0.0396
(CONSTANT)	16.00025	2.55761		6.256	0.0002

FOR BLOCK NUMBER 1 ALL REQUESTED VARIABLES ENTERED.

MULTIPLE REGRESSION RUN 01/14/83

FILE SOLVENCY (CREATION DATE = 01/14/83) DATA FOR PREDICTING AIRLINE FAILURES

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 12. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 12.

DEPENDENT VARIABLE.. UNITED

BEGINNING BLOCK NUMBER 1. METHOD: ENTER

VARIABLE(S) ENTERED ON STEP NUMBER 1.. GNP

MULTIPLE R	0.74937
R SQUARE	0.56155
ADJUSTED R SQUARE	0.50674
STANDARD ERROR	3.62149

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	1	134.37839	134.37839
RESIDUAL	8	104.92155	13.11519

F = 10.24601 SIGNIF F = 0.0126

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
GNP	-0.00670	0.00209	-0.74937	-3.201	0.0126
(CONSTANT)	23.33156	4.13903		5.637	0.0005

FOR BLOCK NUMBER 1 ALL REQUESTED VARIABLES ENTERED.

MULTIPLE REGRESSION RUN 01/14/83

FILE SOLVENCY (CREATION DATE = 01/14/83) DATA FOR PREDICTING AIRLINE FAILURES

**** M U L T I P L E R E G R E S S I O N ****

VARIABLE LIST NUMBER 14. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 14.

DEPENDENT VARIABLE.. TEXAS

BEGINNING BLOCK NUMBER 1. METHOD: ENTER

VARIABLE(S) ENTERED ON STEP NUMBER 1.. FUELCOST

MULTIPLE R	0.45928
R SQUARE	0.21094
ADJUSTED R SQUARE	0.11230
STANDARD ERROR	3.59045

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	1	27.56945	27.56945
RESIDUAL	8	103.13053	12.89132

F = 2.13861 SIGNIF F = 0.1818

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
FUELCOST	-7.20582	4.92740	-0.45928	-1.462	0.1818
(CONSTANT)	10.89586	2.22356		4.900	0.0012

FOR BLOCK NUMBER 1 ALL REQUESTED VARIABLES ENTERED.

MULTIPLE REGRESSION RUN

01/14/83

FILE SOLVENCY (CREATION DATE = 01/14/83) DATA FOR PREDICTING AIRLINE FAILURES

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 13. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 13.

DEPENDENT VARIABLE.. TEXAS

REGRESSION BLOCK NUMBER 1. METHOD: ENTER

VARIABLE(S) ENTERED ON STEP NUMBER 1.. FREITOGS

MULTIPLE R	0.23483
R SQUARE	0.05514
ADJUSTED R SQUARE	-0.06296
STANDARD ERROR	3.92894

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	1	7.20734	7.20734
RESIDUAL	8	123.49265	15.43658

F = 0.46690 SIGNIF F = 0.5137

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
FREITOGS	0.00162	0.00237	0.23483	0.683	0.5137
(CONSTANT)	-0.33547	12.40754		-0.027	0.9791

FOR BLOCK NUMBER 1 ALL REQUESTED VARIABLES ENTERED.

MULTIPLE REGRESSION RUN 01/14/83

FILE SOLVENCY (CREATION DATE = 01/14/83) DATA FOR PREDICTING AIRLINE FAILURES

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 14. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 14.

DEPENDENT VARIABLE.. TEXAS

BEGINNING BLOCK NUMBER 1. METHOD: ENTER

VARIABLE(S) ENTERED ON STEP NUMBER 1.. FUELCOST

MULTIPLE R	0.45928
R SQUARE	0.21094
ADJUSTED R SQUARE	0.11230
STANDARD ERROR	3.59045

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	1	27.56945	27.56945
RESIDUAL	8	103.13053	12.89132

F = 2.13861 SIGNIF F = 0.1818

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
FUELCOST	-7.20582	4.92740	-0.45928	-1.462	0.1818
(CONSTANT)	10.89586	2.22356		4.900	0.0012

FOR BLOCK NUMBER 1 ALL REQUESTED VARIABLES ENTERED.

ULTIPLE REGRESSION RUN 01/10/83

ILE SOLVENCY (CREATION DATE = 01/10/83) DATA FOR PREDICTING AIRLINE FAILURES

**** MULTIPLE REGRESSION ****

ARIABLE LIST NUMBER 15. LISTWISE DELETION OF MISSING DATA.

UATION NUMBER 15.

EPENDENT VARIABLE.. TEXAS

GINNING BLOCK NUMBER 1. METHOD: ENTER

ARIABLE(S) ENTERED ON STEP NUMBER 1.. GNP

ULTIPLE R	0.14907	ANALYSIS OF VARIANCE			
SQUARE	0.02222		DF	SUM OF SQUARES	MEAN SQUARE
DJUSTED R SQUARE	-0.10000	REGRESSION	1	2.90453	2.90453
TANDARD ERROR	3.99680	RESIDUAL	8	127.79546	15.97443

F = 0.18182 SIGNIF F = 0.6811

---------- VARIABLES IN THE EQUATION ----------

ARIABLE	B	SE B	BETA	T	SIG T
GNP	-0.984520-03	0.00231	-0.14907	-0.426	0.6811
(CONSTANT)	9.97178	4.56798		2.183	0.0606

OR BLOCK NUMBER 1 ALL REQUESTED VARIABLES ENTERED.

MULTIPLE REGRESSION RUN 01/14/83

FILE SOLVENCY (CREATION DATE = 01/14/83) DATA FOR PREDICTING AIRLINE FAILURES

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 16. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 16.

DEPENDENT VARIABLE.. TEXAS

REGRESSING BLOCK NUMBER 1. METHOD: ENTER

VARIABLE(S) ENTERED ON STEP NUMBER 1.. PAXREV

MULTIPLE R	0.14387	ANALYSIS OF VARIANCE			
R SQUARE	0.02070		DF	SUM OF SQUARES	MEAN SQUARE
ADJUSTED R SQUARE	-0.10171	REGRESSION	1	2.70529	2.70529
STANDARD ERROR	3.99992	RESIDUAL	8	127.99469	15.99934

F = 0.16909 SIGNIF F = 0.6917

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
PAXREV	0.01211	0.02945	0.14387	0.411	0.6917
(CONSTANT)	5.13677	7.31681		0.702	0.5025

FOR BLOCK NUMBER 1 ALL REQUESTED VARIABLES ENTERED.

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SPSS BATCH SYSTEM                                                    01/14/83

SPSS WITH GRAPHICS OPTION FOR VM/CMS, VERSION 8, RELEASE 9.0, OCTOBER 1, 1981

                              CURRENT DOCUMENTATION FOR THE SPSS BATCH SYSTEM
ORDER FROM MCGRAW-HILL:  SPSS, 2ND ED. (PRINCIPAL TEXT)      ORDER FROM SPSS INC,:  SPSS STATISTICA
                         SPSS UPDATE 7-9 (USE W/SPSS,2ND FOR REL. 7, 8, 9)       KEYWORDS: THE S
                         SPSS POCKET GUIDE, RELEASE 9
                         SPSS PRIMER (BRIEF INTRO TO SPSS)


DEFAULT SPACE ALLOCATION..      ALLOWS FOR..   102 TRANSFORMATIONS
WORKSPACE     71680 BYTES                      409 RECODE VALUES + LAG VARIABLES
TRANSPACE     10240 BYTES                     1601 IF/COMPUTE OPERATIONS

                1 RUN NAME         MULTIPLE REGRESSION RUN
                2 FILE NAME        SOLVENCY  DATA FOR PREDICTING AIRLINE FAILURES
                3 DATA LIST        FIXED(1)/1 PANAM 1-4 TEXAS 6-9 WORLD 13-15
                4                  UNITED 19-22 GNP 26-29 PAXREV 33-35
                5                  FREITONS 39-42 FUELCOST 46-48

THE DATA LIST PROVIDES FOR   8 VARIABLES AND  1 RECORDS ('CARDS') PER CASE.  A MAXIMUM OF   48 COLUMN

LIST OF THE CONSTRUCTED FORMAT STATEMENT..
        (F4.0,1X,F4.0,3X,F3.0,3X,F4.0,3X,F4.0,3X,F3.0,3X,F4.0,3X,F3.0)

                6 INPUT MEDIUM     DISK
                7 REGRESSION       VARIABLES=PAXREV PANAM/DEPENDENT=PANAM/ENTER/
                8                  VARIABLES=FREITONS PANAM/DEPENDENT=PANAM/ENTER/
                9                  VARIABLES=FUELCOST PANAM/DEPENDENT=PANAM/ENTER/
               10                  VARIABLES=GNP PANAM/DEPENDENT=PANAM/ENTER/
               11                  VARIABLES=PAXREV WORLD/DEPENDENT=WORLD/ENTER/
               12                  VARIABLES=FREITONS WORLD/DEPENDENT=WORLD/ENTER/
               13                  VARIABLES=FUELCOST WORLD/DEPENDENT=WORLD/ENTER/
               14                  VARIABLES=GNP WORLD/DEPENDENT=WORLD/ENTER/
               15                  VARIABLES=PAXREV UNITED/DEPENDENT=UNITED/ENTER/
               16                  VARIABLES=FREITONS UNITED/DEPENDENT=UNITED/ENTER/
               17                  VARIABLES=FUELCOST UNITED/DEPENDENT=UNITED/ENTER/
               18                  VARIABLES=GNP UNITED/DEPENDENT=UNITED/ENTER/
               19                  VARIABLES=FREITONS TEXAS/DEPENDENT=TEXAS/ENTER/
               20                  VARIABLES=FUELCOST TEXAS/DEPENDENT=TEXAS/ENTER/
               21                  VARIABLES=GNP TEXAS/DEPENDENT=TEXAS/ENTER/
               22                  VARIABLES=PAXREV TEXAS/DEPENDENT=TEXAS/ENTER/

REGRESSION PROCEDURE REQUIRES    24488 BYTES OF WORKSPACE.

END OF DATA WAS ENCOUNTERED ON LOGICAL UNIT # 8
```

MULTIPLE REGRESSION RUN 01/14/83

FILE SOLVENCY (CREATION DATE = 01/14/83) DATA FOR PREDICTING AIRLINE FAILURES

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 1. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 1.

DEPENDENT VARIABLE.. PANAM

BEGINNING BLOCK NUMBER 1. METHOD: ENTER

VARIABLE(S) ENTERED ON STEP NUMBER 1.. PAXREV

MULTIPLE R	0.02490
R SQUARE	0.00062
ADJUSTED R SQUARE	-0.12430
STANDARD ERROR	4.45683

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	1	0.09860	0.09860
RESIDUAL	8	158.90640	19.86330

F = 0.00496 SIGNIF F = 0.9456

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
PAXREV	0.00231	0.03281	0.02490	0.070	0.9456
(CONSTANT)	7.48428	8.15217		0.918	0.3854

FOR BLOCK NUMBER 1 ALL REQUESTED VARIABLES ENTERED.

MULTIPLE REGRESSION RUN 01/14/83

FILE SOLVENCY (CREATION DATE = 01/14/83) DATA FOR PREDICTING AIRLINE FAILURES

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 2. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 2.

DEPENDENT VARIABLE.. PANAM

BEGINNING BLOCK NUMBER 1. METHOD: ENTER

VARIABLE(S) ENTERED ON STEP NUMBER 1.. FRFITDUS

MULTIPLE R	0.09557	ANALYSIS OF VARIANCE			
R SQUARE	0.00913		DF	SUM OF SQUARES	MEAN SQUARE
ADJUSTED R SQUARE	-0.11472	REGRESSION	1	1.45232	1.45232
STANDARD ERROR	4.43780	RESIDUAL	8	157.55268	19.69409

F = 0.07374 SIGNIF F = 0.7928

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
FRFITDUS	0.727600-03	0.00268	0.09557	0.272	0.7928
(CONSTANT)	4.26337	14.01452		0.304	0.7687

FOR BLOCK NUMBER 1 ALL REQUESTED VARIABLES ENTERED.

MULTIPLE REGRESSION RUN 01/14/83

FILE SOLVENCY (CREATION DATE = 01/14/83) DATA FOR PREDICTING AIRLINE FAILURES

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 3. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 3.

DEPENDENT VARIABLE.. PANAM

BEGINNING BLOCK NUMBER 1. METHOD: ENTER

VARIABLE(S) ENTERED ON STEP NUMBER 1.. FUELCOST

MULTIPLE R	0.38897	ANALYSIS OF VARIANCE			
R SQUARE	0.15130		DF	SUM OF SQUARES	MEAN SQUARE
ADJUSTED R SQUARE	0.04521	REGRESSION	1	24.05733	24.05733
STANDARD ERROR	4.10712	RESIDUAL	8	134.94768	16.86846

F = 1.42617 SIGNIF F = 0.2666

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
FUELCOST	-6.73120	5.63646	-0.38897	-1.194	0.2666
(CONSTANT)	10.66171	2.54354		4.192	0.0030

FOR BLOCK NUMBER 1 ALL REQUESTED VARIABLES ENTERED.

MULTIPLE REGRESSION RUN 01/14/83

FILE SOLVENCY (CREATION DATE = 01/14/83) DATA FOR PREDICTING AIRLINE FAILURES

**** M U L T I P L E R E G R E S S I O N ****

VARIABLE LIST NUMBER 4. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 4.

DEPENDENT VARIABLE.. PARAM

BEGINNING BLOCK NUMBER 1. METHOD: ENTER

VARIABLE(S) ENTERED ON STEP NUMBER 1.. GDP

MULTIPLE R	0.15747
R SQUARE	0.02480
ADJUSTED R SQUARE	-0.09710
STANDARD ERROR	4.40258

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	1	3.94305	3.94305
RESIDUAL	8	155.06195	19.38274

F = 0.20343 SIGNIF F = 0.6639

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
GDP	-0.00115	0.00254	-0.15747	-0.451	0.6639
(CONSTANT)	10.23089	5.03175		2.033	0.0765

FOR BLOCK NUMBER 1 ALL REQUESTED VARIABLES ENTERED.

01/14/83

MULTIPLE REGRESSION RUN

FILE SOLVENCY (CREATION DATE = 01/14/83) DATA FOR PREDICTING AIRLINE FAILURES

* * * * M U L T I P L E R E G R E S S I O N * * * *

VARIABLE LIST NUMBER 5. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 5.

DEPENDENT VARIABLE.. WORLD

REGRESSION BLOCK NUMBER 1. METHOD: ENTER

VARIABLE(S) ENTERED ON STEP NUMBER 1.. PAXREV

MULTIPLE R	0.45313
R SQUARE	0.20533
ADJUSTED R SQUARE	0.10599
STANDARD ERROR	0.91368

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	1	1.72558	1.72558
RESIDUAL	8	6.67842	0.83480

F = 2.06705 SIGNIF F = 0.1885

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
PAXREV	-0.00967	0.00673	-0.45313	-1.438	0.1885
(CONSTANT)	4.02660	1.67124		2.409	0.0426

FOR BLOCK NUMBER 1 ALL REQUESTED VARIABLES ENTERED.

MULTIPLE REGRESSION RUN 01/14/85

FILE SOLVENCY (CREATION DATE = 01/14/85) DATA FOR PREDICTING AIRLINE FAILURES

**** M U L T I P L E R E G R E S S I O N ****

VARIABLE LIST NUMBER 6. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 6.

DEPENDENT VARIABLE.. WORLD

BEGINNING BLOCK NUMBER 1. METHOD: ENTER

VARIABLE(S) ENTERED ON STEP NUMBER 1.. FREITONS

MULTIPLE R	0.22807	ANALYSIS OF VARIANCE			
R SQUARE	0.05021		DF	SUM OF SQUARES	MEAN SQUARE
ADJUSTED R SQUARE	-0.06852	REGRESSION	1	0.42194	0.42194
STANDARD ERROR	0.99888	RESIDUAL	8	7.98206	0.99776

F = 0.42288 SIGNIF F = 0.5337

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
FREITONS	-0.592180-03	0.603110-03	-0.22807	-0.650	0.5337
(CONSTANT)	3.70101	3.15600		1.173	0.2744

FOR BLOCK NUMBER 1 ALL REQUESTED VARIABLES ENTERED.

MULTIPLE REGRESSION RUN 01/14/83

FILE SOLVENCY (CREATION DATE = 01/14/83) DATA FOR PREDICTING AIRLINE FAILURES

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 7. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 1.

DEPENDENT VARIABLE.. WORLD

BEGINNING BLOCK NUMBER 1. METHOD: ENTER

VARIABLE(S) ENTERED ON STEP NUMBER 1.. FUELCOST

MULTIPLE R	0.65272	ANALYSIS OF VARIANCE			
R SQUARE	0.42604		DF	SUM OF SQUARES	MEAN SQUARE
ADJUSTED R SQUARE	0.35430	REGRESSION	1	3.58047	3.58047
STANDARD ERROR	0.77649	RESIDUAL	8	4.82352	0.60294

F = 5.93835 SIGNIF F = 0.0408

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
FUELCOST	-2.59681	1.06563	-0.65272	-2.437	0.0408
(CONSTANT)	2.66756	0.48088		5.547	0.0005

FOR BLOCK NUMBER 1 ALL REQUESTED VARIABLES ENTERED.

01/14/83

MULTIPLE REGRESSION RUN

FILE SOLVENCY (CREATION DATE = 01/14/83) DATA FOR PREDICTING AIRLINE FAILURES

**** M U L T I P L E R E G R E S S I O N ****

VARIABLE LIST NUMBER 8. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 8.

DEPENDENT VARIABLE.. WORLD

BEGINNING BLOCK NUMBER 1. METHOD: ENTER

VARIABLE(S) ENTERED ON STEP NUMBER 1.. GNP

MULTIPLE R	0.50040
R SQUARE	0.25040
ADJUSTED R SQUARE	0.15670
STANDARD ERROR	0.88739

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	1	2.10435	2.10435
RESIDUAL	8	6.29965	0.78746

F = 2.67233 SIGNIF F = 0.1407

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
GNP	-0.837830-03	0.51250-03	-0.50040	-1.635	0.1407
(CONSTANT)	5.25322	1.01420		3.208	0.0125

FOR BLOCK NUMBER 1 ALL REQUESTED VARIABLES ENTERED.

MULTIPLE REGRESSION RUN 01/14/83

FILE SOLVENCY (CREATION DATE = 01/14/83) DATA FOR PREDICTING AIRLINE FAILURES

**** MULTIPLE REGRESSION ****

VARIABLE LIST NUMBER 9. LISTWISE DELETION OF MISSING DATA.

EQUATION NUMBER 9.

DEPENDENT VARIABLE.. UNITED

BEGINNING BLOCK NUMBER 1. METHOD: ENTER

VARIABLE(S) ENTERED ON STEP NUMBER 1.. PAXREV

MULTIPLE R	0.69640	ANALYSIS OF VARIANCE			
R SQUARE	0.48497		DF	SUM OF SQUARES	MEAN SQUARE
ADJUSTED R SQUARE	0.42059	REGRESSION	1	116.05280	116.05280
STANDARD ERROR	3.92503	RESIDUAL	8	123.24713	15.40589

F = 7.53301 SIGNIF F = 0.0253

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	T	SIG T
PAXREV	-0.07931	0.02890	-0.69640	-2.745	0.0253
(CONSTANT)	30.00825	7.17944		4.180	0.0031

FOR BLOCK NUMBER 1 ALL REQUESTED VARIABLES ENTERED.

VAR NAME	MEAN	UNBIASED VARIANCE	UNBIASED STD DEV
GNP	1901.8	333090.045	577.1335
FLITOP	31.61	67.541	8.2183

MODEL	UNADJUSTED R 2
1. LINEAR	.85[illegible]2148
2. POWER	.8352683124
3. EXPONENTIAL	.8598932867
4. LOGRITHMIC	.8422900835
5. HYPERBOLIC 1	.8183300276
6. HYPERBOLIC 2	.8378452681
7. HYPERBOLIC 3	.7162689878

Y = 56.58655 + -.01313 * X

UNADJUSTED R^2 = .85033
CORRELATION COEFFICIENT = .92218

STD ERROR OF ESTIMATE = 3.37177
VARIANCE OF ESTIMATE = 11.36831

DEGREES OF FREEDOM = 8

WITH X = GNP AND Y = FLITOP

	ACTUAL X	ACTUAL Y	PREDICTED Y	RESIDUAL
1	1171	42.5	41.2038	1.2962
2	1307	43.6	39.4179	4.1821
3	1419	33.6	38.026	-4.426
4	1529	33.6	36.5037	-2.9037
5	1702	31.7	34.231	-2.531
6	1900	31.8	31.631	.169
7	2128	34.2	28.6371	5.5629
8	2414	26.3	24.8315	1.3185
9	2626	19.6	22.0977	-2.4977
10	2836	19.1	19.4714	-.3714

VAR NAME	MEAN	UNBIASED VARIANCE	UNBIASED STD DEV
FCOST	.386	.0593	.2436
FLYTGR	31.61	67.541	8.2183

MODEL	UNADJUSTED R^2
1. LINEAR	.771208701
2. POWER	.891473135
3. EXPONENTIAL	.858844402
4. LOGRITHMIC	.887473991
5. HYPERBOLIC 1	.835533544
6. HYPERBOLIC 2	.917212486
7. HYPERBOLIC 3	[illegible]

POWER Y = A * X^B

Y = 17.73387 * X^-.49711

UNADJUSTED R^2 = .88147
CORRELATION COEFFICIENT = .94418

STD ERROR OF ESTIMATE = .09836
VARIANCE OF ESTIMATE = 9.65E-03

DEGREES OF FREEDOM = 8

WITH X = FCOST AND Y = FLITOP

	ACTUAL X	ACTUAL Y	PREDICTED Y	RESIDUAL
1	.2	42.5	39.4689	3.0311
2	.2	43.6	39.4689	4.1311
3	.2	33.8	39.4689	-5.6689
4	.25	33.6	35.3248	-1.7248
5	.3	31.7	32.264	-.564
6	.3	31.8	32.264	-.464
7	.37	34.2	29.0638	5.1362
8	.39	26.2	28.3189	-2.1189
9	.75	19.6	20.4597	-.8597
10	.9	19.1	18.6869	.4131

HYPERBOLIC 2 Y = 1/ A + B*X)

- -

Y = 1 / (.01838 + .04037 * X)

UNADJUSTED R^2 = .91771
CORRELATION COEFFICIENT = .95771

STD ERROR OF ESTIMATE = 3.13E-03
VARIANCE OF ESTIMATE = .03-09

DEGREES OF FREEDOM 8

WITH X = SCOST AND Y = FLYTOF

- -

	ACTUAL X	ACTUAL Y	PREDICTED Y	RESIDUAL
1	.2	42.5	37.8058	4.6942
2	.2	43.6	37.8058	5.7942
3	.2	33.8	37.8058	-4.0058
4	.25	33.6	35.1257	-1.525.
5	.3	31.7	32.8003	-1.1003
6	.3	31.8	32.8003	-1.0003
7	.37	34.2	30.0182	4.1818
8	.39	26.2	29.308	-3.108
9	.75	19.6	20.5541	-.9541
10	.9	19.1	18.2793	.8207

VAR NAME	MEAN	UNBIASED VARIANCE	UNBIASED STD DEV
PEVPAX	344.4	2022.4989	44.9721
FLITOP	31.61	67.541	8.2183

MODEL		UNADJUSTED R^2
1.	LINEAR	.654390883
2.	POWER	.644636665
3.	EXPONENTIAL	.634370836
4.	LOGRITHMIC	.669431546
5.	HYPERBOLIC 1	.67995095
6.	HYPERBOLIC 2	.590336497
7.	HYPERBOLIC 3	.597729687

HYPERBOLIC 1 Y = A + (B/X)

Y = -6.50819 + 9042.42157 / X

ADJUSTED R^2 = .67595
CORRELATION COEFFICIENT = .82459

STD ERROR OF ESTIMATE = 4.99139
VARIANCE OF ESTIMATE = 24.91848

DEGREES OF FREEDOM = 8

WITH X = REVPAX AND Y = FLITOF

	ACTUAL X	ACTUAL Y	PREDICTED Y	RESIDUAL
	191	42.5	40.8396	1.6604
	203	43.6	38.2616	5.3384
	207	33.8	37.1803	-3.3803
	205	33.6	37.6065	-4.0065
	229	31.7	33.1568	-1.4568
	240	31.8	31.1738	.6262
	274	34.2	26.4986	7.7014
	316	26.2	22.1123	4.0877
	296	19.6	24.0457	-4.4457
0	285	19.1	25.2248	-6.1248

Y = 37.73937 + -.14755 * X

UNADJUSTED R^2 = .51439
CORRELATION COEFFICIENT = .71721

STD ERROR OF ESTIMATE = 5.13451
VARIANCE OF ESTIMATE = 26.36065

DEGREES OF FREEDOM = 8

WITH X = REVPAX AND Y = FLITOF

	ACTUAL X	ACTUAL Y	PREDICTED Y	RESIDUAL
1	191	42.5	39.5041	2.9959
2	202	45.6	37.8779	5.7221
3	207	33.8	37.1388	-3.3388
4	209	33.6	36.8345	-3.8345
5	226	31.7	34.0344	-2.3344
6	240	31.8	32.2604	-.4604
7	274	34.2	27.2343	6.9657
8	316	26.2	21.0255	5.1745
9	296	19.6	23.982	-4.382
10	289	19.1	25.6081	-6.5081

VAR NAME	MEAN	UNBIASED VARIANCE	UNBIASED STD DEV
FPTTON	5203.9	304565.434	551.8745
FLITGP	31.61	67.541	8.2193

MODEL	UNADJUSTED R^2
1. LINEAR	.583571475
2. POWER	.52919991
3. EXPONENTIAL	.528288902
4. LOGRITHMIC	.587694907
5. HYPERBOLIC 1	.587997482
6. HYPERBOLIC 2	.461172749
7. HYPERBOLIC 3	.454968583

Y = 90.80969 + -.01138 * X

UNADJUSTED R^2 = .58357
CORRELATION COEFFICIENT = .76392

STD ERROR OF ESTIMATE = 5.6251
VARIANCE OF ESTIMATE = 31.64175

DEGREES OF FREEDOM = 8

WITH X = EPTTON AND Y = FLITOP

	ACTUAL X	ACTUAL Y	PREDICTED Y	RESIDUAL
1	4217	42.5	42.837	-.337
2	4736	43.6	36.9328	6.6672
3	4890	33.8	35.1809	-1.3809
4	4766	33.6	36.5916	-2.9916
5	5074	31.7	33.0877	-1.3877
6	5385	31.8	29.5498	2.2502
7	5763	34.2	25.2497	8.9503
8	5907	26.2	23.6115	2.5885
9	5685	19.6	26.137	-6.537
10	5616	19.1	26.9219	-7.8219

Y = -25.01572 + 291560.17 / X

UNADJUSTED R^2 = .588
CORRELATION COEFFICIENT = .76681

STD ERROR OF ESTIMATE = 5.59513
VARIANCE OF ESTIMATE = 31.30544

DEGREES OF FREEDOM = 8

WITH X = FRTTON AND Y = FLYTGR

ACTUAL 'X'	ACTUAL 'Y'	PREDICTED 'Y'	RESIDUAL
4217	42.5	44.1235	-1.6235
4736	43.6	36.5468	7.0532
4890	33.8	34.608	-.808
4766	33.6	36.1593	-2.5593
5074	31.7	32.4459	-.7459
5385	31.8	29.1273	2.6727
5763	34.2	25.576	8.624
5907	26.2	24.3427	1.8573
5685	19.6	26.2702	-6.6702

NOTES

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